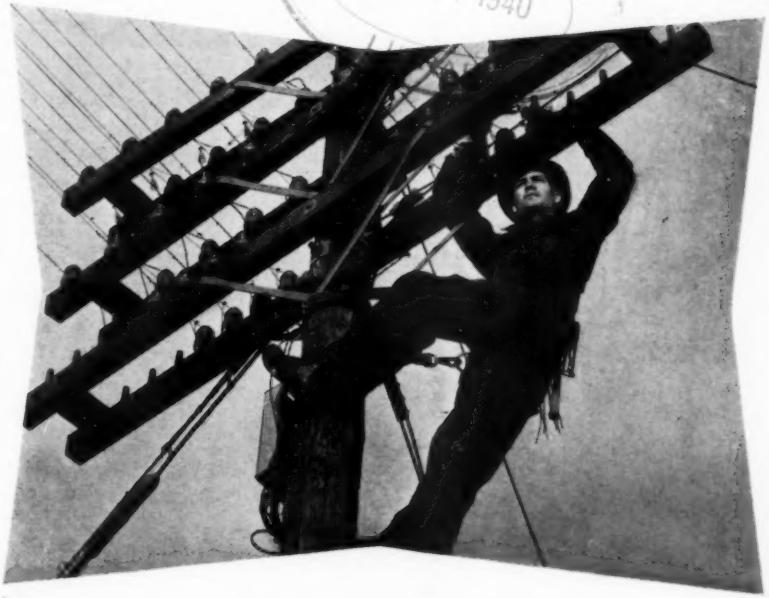
TELEPHONY

THE JOHN CRERAR
APR 27 1940



VOLUME 118

APRIL 27, 1940

NUMBER 17

SERVICE COMPLETE!

Office and Order Editing Department
227 Different Products on Warehouse Shelves
Wire, Brackets, Rods Ready for Shipment

Every hour — on the hour — supply shipments leave the Leich warehouse bound for telephone companies everywhere. They include all things necessary to build and maintain telephone properties—from wire, brackets and hardware for outside construction down to the smallest nail for interior wiring. Each product is of established telephone specification quality and carries the broadest possible guarantee of full and complete satisfaction.

Every month sees more and more telephone companies turning to Leich for all their construction material and supply needs. They appreciate the swift handling of their orders and the intelligent interpretation of their requirements. They know that the prices will be the lowest possible consistent with quality and that every order — large or small — will receive the same careful consideration by a progressive organization that is ever striving to do a better and more economical job for them.

Telephone men not now familiar with Leich Supply Service are urged to make a convincing test by marking their next purchase requisition "Buy from Leich." Copies of Leich's "Redbook" Catalog gladly sent upon request.

LEICH SALES CORPORATION

427 W. RANDOLPH STREET.. CHICAGO. ILLINOIS

TELEPHONY. April 27, 1940. Volume 118. No. 17. Published every week on Saturday by TELEPHONY PUBLISHING CORPORATION, 608 So. Dearborn St.. Chicago, Ill. Telephone Wabash 8604. Subscription $3.00 per year. Entered as second class matter September 4, 1908, at the Post Office at Chicago, Ill., under the act of March 3, 1879.

Another PERFORMANCE record

PEG COUNT READINGS

From	No. of Calls	Position No. 3		No. of Local Positions		Average	No. Positions Over 500
:00-10:00 AM	6885	— 162	= 6723	÷ 15	=	448	4
:00-11:00 AM	6717	— 147	= 6570	÷ 15	=	438	2
:00-12:00 AM	6789	— 300	= 6489	÷ 15	=	432	3
:00- 1:00 PM	4526	— 132	= 4394	÷ 14	=	314	0
:00- 2:00 PM	5421	— 182	= 5239	÷ 13	=	402	1
:00- 3:00 PM	5733	— 314	= 5419	÷ 14	=	387	1
:00- 4:00 PM	5153	— 319	= 4834	÷ 14	=	345	1
:00- 5:00 PM	6356	— 289	= 6067	÷ 15	=	404	2
:00- 6:00 PM	6886	— 282	= 6604	÷ 15	=	440	2
:00- 7:00 PM	6376	— 213	= 6163	÷ 15	=	411	0
:00- 8:00 PM	5718	— 207	= 5511	÷ 15	=	367	1
	66,560		64,013			399	

Total 24 Hr. Peg Count - 80,287
Average Saturday Load - 50,000

	Peg Count	Position 3		No. Positions		Average	High Positions
:00-10:00 AM	6885	— 162	= 6723	÷ 15	=	448	513
:00- 6:00 PM	6886	— 282	= 6604	÷ 15	=	440	630

revious Peak Load for 24 hour period - 62,000 Local Calls

FOR THE STROMBERG-CARLSON SUPER-SERVICE SWITCHBOARD

Every telephone man knows the demands a paralyzing storm places on facilities of the telephone exchange. This winter when such a storm hit Jefferson City, Mo., the exchange of the Capital City Telephone Co., thanks to its Stromberg-Carlson Super-Service Switchboard, was able to meet the demand.

Through their Stromberg-Carlson Super-Service Switchboard flowed 80,000 calls in 24 hours . . . 30,000 more than normal. Some operators averaged 500 calls per hour. One operator handled 650 between 5:00 and 6:00 P. M. — practically 11 calls a minute. All this was done without the knowledge of the subscribers, owing to the smooth operation of the Stromberg-Carlson Super-Service Switchboard.

While there are many features which promote this fast and accurate service, an outstanding one is the simplified keyboard which instead of presenting a confusing array of party line push buttons before each operator's position has but one button for each ringing frequency — consequently the operator can work much faster and far more accurately.

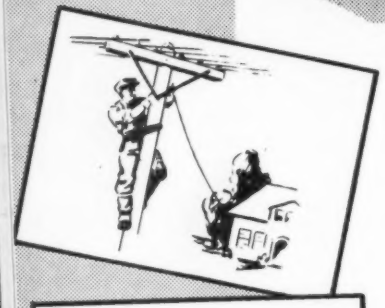
Let us send you illustrated Bulletin describing Stromberg-Carlson Super-Service Switchboards for exchanges of from 600 to 10,000 lines.

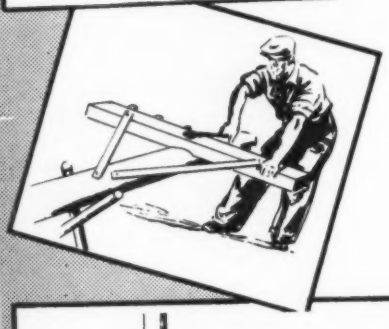
Stromberg-Carlson Telephone Mfg. Co., Factory & General Offices: 100 Carlson Road Rochester, N. Y. Branch Offices: Chicago, Kansas City, San Francisco, Toronto

Stromberg-Carlson

MAKERS OF VOICE TRANSMISSION AND VOICE RECEPTION APPARATUS FOR FORTY FIVE YEARS

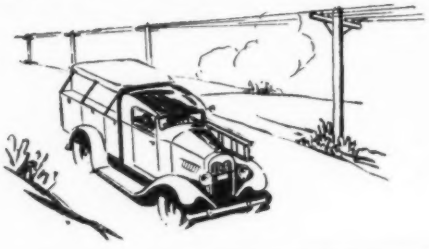
COAST

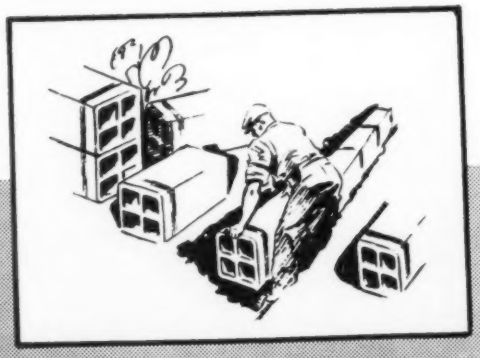




You GET THE ADVANTAGES OF..

GREATER DISTRIBUTION FACILITIES





TO COAST

BORDER TO BORDER

You Get This Faster, More Satisfying Service Through Kellogg's Great Network of Line Material Warehouses

WHEN YOU buy your line supplies from Kellogg you draw upon nearly 50 well-stocked warehouses. This unusual network of line material centers . . . spotted from Coast to Coast . . . is the reason why you can always rely upon Kellogg's speedier, more satisfying service. Complete pole line hardware stocks are carried at 15 strategic points! Bare and insulated wire stocked at 22 shipping centers and poles are carried at 11 yards. In addition, nearly a dozen other warehouses handle anchors, pins and brackets, tools and cross-arms. These facilities are your assurance of getting supplies fast, when you want them. Everything you need is here awaiting your orders . . . and everything you buy from Kellogg is backed by the famous "Double Guarantee."

SPEEDIER SHIPMENTS

FULL AND COMPLETE STOCKS

FINEST QUALITY AT RIGHT PRICES

✓ **FOR YOUR CONVENIENCE USE THIS CHECKLIST**

LINE SUPPLIES
Anchors: Guy, Nail and Screw
Bolts: Carriage, Machine and Lag
Braces: Crossarm, Back and Angle
Brackets: House, Pole and Transposition
Cable: Telephone and Switchboard
Clamps: Guy, Span and Cable
Conduit: Clay, Fibre and Wood
Clips: Guy, Drop Wire and Test
Crossarms: Creosoted Pine and Douglas Fir
Guards: Cable, Hub, Manhole and Tool
Grips: Cable, Drop Wire and Buffalo
Insulators: Glass, Porcelain and Strain
Kits: First Aid and Tool
Knobs: Porcelain and Knob Racks
Ladders: Extension, Step and Platform
Manhole Covers, Frames and Guards
Nails: Galvanized and Pole Dating
Poles: Creosoted Pine, Northern and Western Cedar
Rings: Bridle, Cable and Drive
Rods: Anchor, Duct and Ground

TOOLS
Augers and Blow Torches
Bolt Cutters and Digging Bars
Jacks: Cable and Pole
Linemen's Belts, Climbers and Straps
Pike Poles, Pliers and Pulleys
Screw Drivers and Soldering Irons
Tool Bags and Tool Kits
Tree Trimmers and Wrenches

WIRE
Drop: Kellogg Armored Bronze
Drop: Copper and Iron
Indiana Crapo Iron Telephone Wire
Indiana Crapo Galvanized Steel Strand
Bridle and Tree
Jumper and Interior
Lashing and Bonding

PROTECTION
Arresters and Arrester Carbons
Arrester Blocks and Arrestor Clips
Fuses for Arresters and Cable Terminals
Fuse Wire: Bronze and Copper
Terminals: Cable and Terminal Boxes

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SWITCHBOARD & SUPPLY CO., CHICAGO

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MacGillis & Gibbs

CEDAR POLES

Northern White and Western Red Cedar Poles produced by The MacGillis & Gibbs Company have been distributed by Kellogg for over 27 years. Shipments can be made in 24 hours from Minneapolis, Minnesota or Gladstone, Michigan plants, butt-treated or untreated. Remember Cedar Poles are clean, light in weight, non-conductive. One of the most durable and long lived woods produced. Why not use poles you ***know will last?***

Joslyn

POLE LINE HARDWARE

Joslyn Pole Line Hardware stands up under the worst weather conditions. It is not affected by time—a coating of pure zinc protects it against rust and corrosion. Joslyn products are built to meet a standard—not a price. Complete stocks are carried at warehouses throughout the country to assure you fast, efficient service at any time, anywhere.

Hemingray

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Hemingray Glass Insulators pass every test—tough to withstand rough handling—impervious to moisture—do not age or deteriorate—high mechanical and sustained dielectric strength—unaffected by sudden temperature changes. Made of improved, flawless glass they are homogeneous in character and stand up under heat, cold, storms and age. Write us about your insulator requirements.

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HIGH-STRENGTH LINE WIRES

Crapo HTL-85 High-tensile, Low-resistance Telephone Line Wire permits spans to 225 feet in heavy loading district . . . cuts costs on new construction . . . provides stronger spans, with less maintenance, on existing lines. **Crapo HTL-135,** of still greater tensile strength, permits spans to 350 feet in heavy loading areas . . . reduces number of pole structures . . . makes line extension more economical and profitable. Write for Indiana Bulletins No. 201 and No. 202.

WE Recom HE

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ORDER TELEPHONE LI

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ONELINE SUPPLIES
from
RD AND SUPPLY COMPANY
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Everstick

ANCHORS

Made of Certified Malleable Iron—the toughest, strongest material for anchor purposes. Certified Malleable Iron is superior in rust resistant qualities, assuring long service without deterioration. The extra "holding power" of Eversticks has been proven in heavy winds, floods, snow and sleet. Accepted and adopted by large anchor users everywhere. Use Everstick and be sure.

National's Nicopress

SLEEVES AND TOOLS

There's no guessing when you make splices the Nicopress way—for every line joint made with Nicopress sleeves and tools will . . . (1) equal or exceed the rated breaking strength of the conductors; (2) be tight as a weld: conductor will not pull out; (3) have high conductivity; (4) be easily made either in the air or on the ground. For improved efficiency all along the line—adopt the Nicopress method.

Porcelain Products

KNOBS AND TUBES

Porcelain Products Knobs and Tubes provide maximum protection and strength. Constant laboratory checks, inspection during every step of their manufacture, and uniformity of size, all guarantee you quality Insulators that will save you time and money. Packed in sizes to suit your requirements. Unusual shipping facilities assure prompt delivery to all points.

Armoured Bronze

DROP WIRE

20% longer life! . . . proved by millions and ***millions*** of feet in service. A special armoured coat of Mica, a better method of tracer identification banishing forever the old wear-inducing raised tracer. Long life, moisture-proof insulation. The solid bronze conductor is unequalled: 85% conductivity, 32 ohms resistance, high tensile strength, flexibility and ductility. Order Kellogg Armoured Bronze Drop Wire today!

Telephone Switchboard Cable ... Silk and Cotton Insulated Braided or Leaded
Twisted Pair Telephone Wire...Rubber Insulated and Braided, Also Twin Parallel Telephone Wire —in Steel, Copper, or Bronze Conductor
Bare Copper or Bronze Wire
ROEBLING
electrical
Wire & Cable
Galvanized Messenger or Guy Strand
Telephone Cable...Paper Insulated and Leaded
Galvanized Telephone or Telegraph Wire, All Grades

ROEBLING makes available a wide variety of electrical wires and cables to meet practically every telephone and telegraph need. In addition to those shown, Roebling also makes a complete line of electrical wires and cables from hair-fine magnet wire to heavy submarine cable.

Further information and samples on any of these will gladly be furnished by the nearest Roebling office listed below.

JOHN A. ROEBLING'S SONS COMPANY
TRENTON, N. J.
Atlanta Boston Chicago Cleveland Los Angeles New York Philadelphia Portland, Ore. San Francisco Seattle

ONLY A FINE PRODUCT MAY BEAR THE NAME ROEBLING

Here's the Answer to Your Under- Or Over-charged Battery Problem

THE NEW G-E FULLY AUTOMATIC COPPER OXIDE TELEPHONE BATTERY CHARGER

.....Responds automatically to battery voltage—the best indicator of true battery condition.

.....Inverse temperature compensated automatic control responds to room temperature and provides proper charging voltage for given temperature.

.....Battery protected against under- or over-charging.

.....When installed, can be adjusted to meet the requirements of any particular battery.

.....Once installed and adjusted—no further attention is required.

.....Eight different models available—and priced right.

There is a new descriptive sheet on this new line of Fully Automatic General Electric Copper Oxide Battery Chargers for Telephone Service.

See your nearest General Electric Merchandise Distributor or write direct to us. Section A-085, Appliance and Merchandise Department, General Electric Company, Bridgeport, Connecticut.

DANGERS FROM OVER-CHARGED BATTERIES

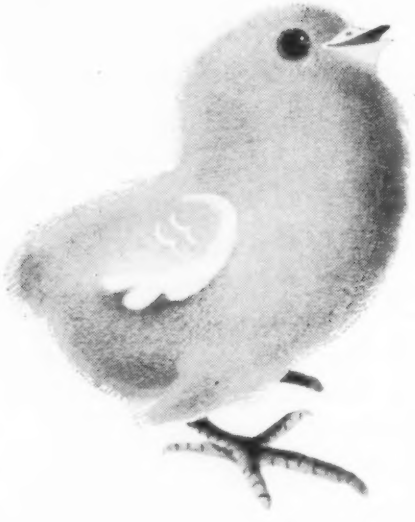
1. Short battery life
2. Rapid deterioration of relays
3. Reduced lamp life
4. Defective transmitters
5. Noisy system

GENERAL ELECTRIC

XUM

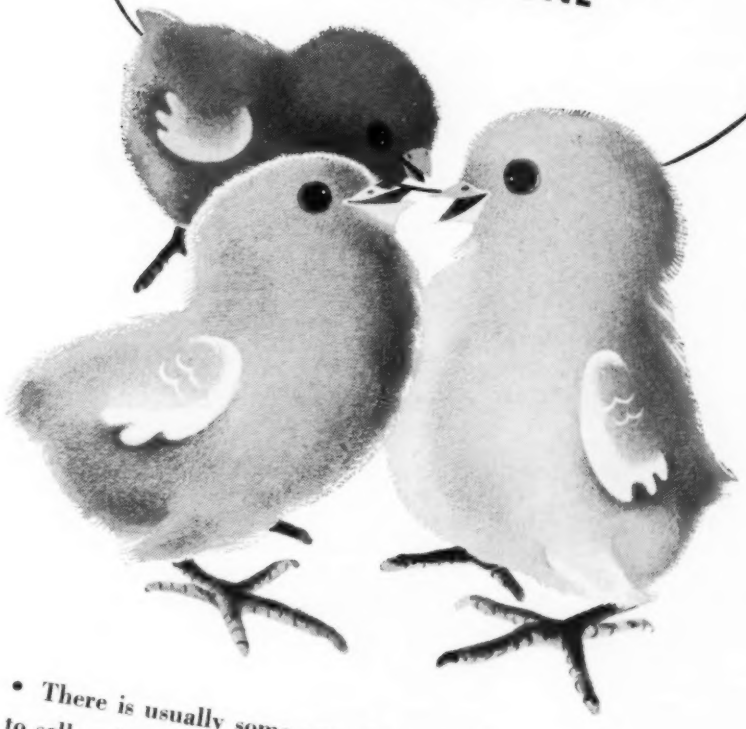
CHICKS HELP SELL TELEPHONE—
TELEPHONE HELPS SELL CHICKS

The advertisement on the opposite page is one of a regular series appearing in rural publications. This one is being read during March and April. Advertising like this, by reminding farmers of the speed and usefulness of the telephone, should benefit the telephone industry in all rural areas.



AN ADVERTISEMENT OF THE BELL TELEPHONE SYSTEM

"THE BOSS EXPECTS
TO SELL US ANY TIME NOW
BY TELEPHONE"

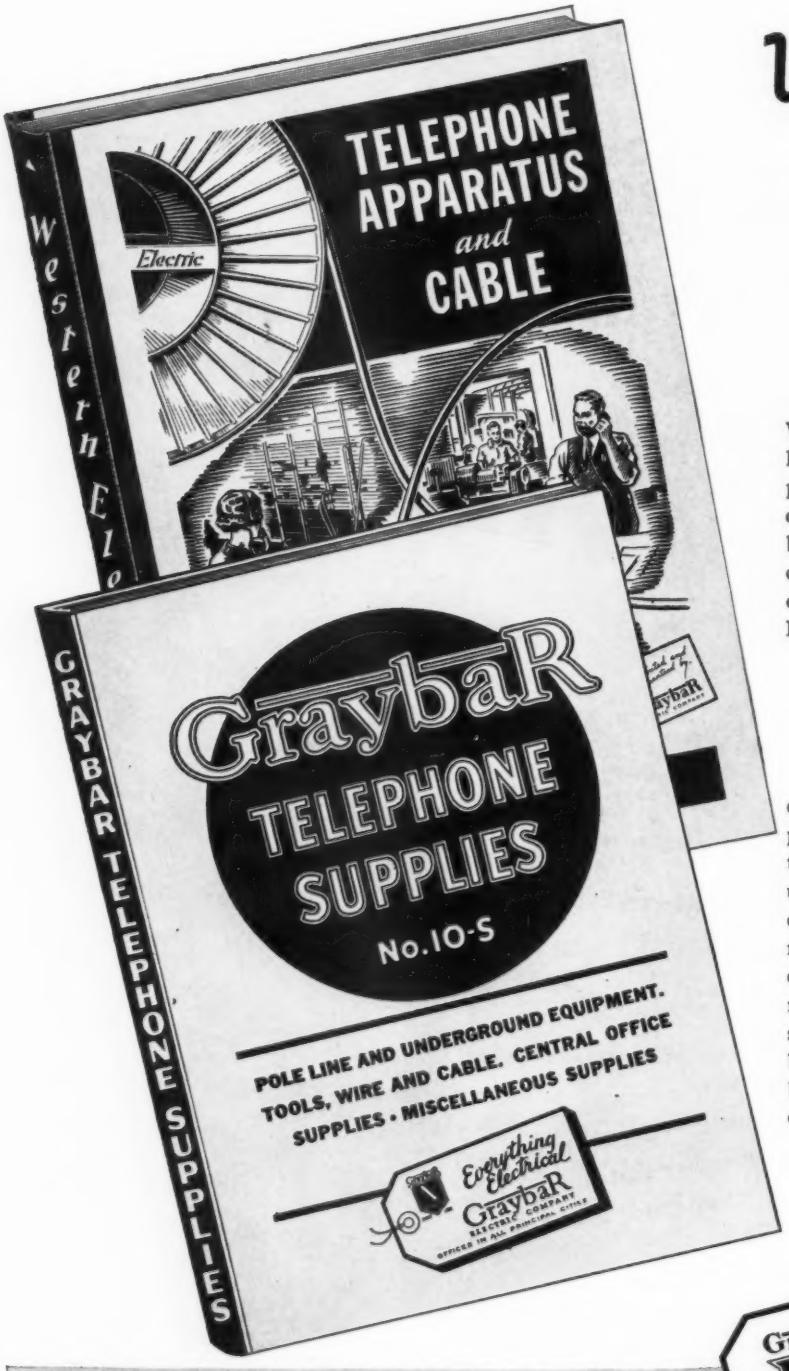


• There is usually some one who wants what you have to sell and some one who has for sale what you want to buy. It will pay you to remember that the quick, easy way to get in touch with seller or buyer is by telephone.

BELL TELEPHONE SYSTEM

HAVE YOU RECEIVED...

Your Copies of these Catalogs?



Western Electric's new 300-page Catalog No. 10 lists all standard equipment, plus latest carrier telephone units and other new developments. Initial distribution of this catalog is now practically complete. If you have not received a copy, check with your GRAYBAR Representative.

GRAYBAR'S own 180-page catalog: Telephone Supplies (No. 10-S) rounds out the 1940 picture with complete and up-to-the-minute buying information on pole line and underground equipment, tools, wire and cable, central office supply items, and a wide line of miscellaneous electrical and wiring supplies. Initial distribution is now being made and should be completed by April 30. Check with your local GRAYBAR Representative.

OFFICES IN 82 PRINCIPAL CITIES

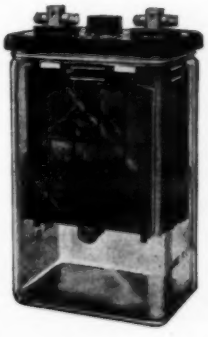
EXECUTIVE OFFICES: GRAYBAR BUILDING, NEW YORK, N. Y.

GraybaR QUALITY Since 1869 *Everything Electrical* GraybaR ELECTRIC COMPANY

A hurricane that paralyzed two states failed to halt telephone service

Telephone poles and wires and cables are well made and well installed . . . but nothing man-made can be immune to a catastrophe of nature. When a recent hurricane swept several northeastern states it carried away many lines, just as it paralyzed transportation and cut off electric light and power. It is a tribute to the courage and resourcefulness of telephone personnel that within a matter of hours telephone calls again could be completed to nearly any station in the devastated area.

Dependability is a telephone tradition, applying as much to telephone equipment as to the men and women who are charged with its faithful operation. Sharing this traditional dependability, Exide Batteries played a vital part in maintaining service following the hurricane. During emergencies, as in day in, day out routine, they prove again every hour of the day their sure ability to help maintain the highest standards of quick, clear service.



Neither fluctuations nor interruption of the a.c. power affects the steady flow of energy from Exide Batteries. They have a tremendous reserve instantly available for emergencies. No matter what the service—common battery, emergency reserve, signal, or P. B. X., in small or large exchanges—you will find Exides uniformly able to deliver long, trouble-free life with characteristic telephone dependability.

Exide
TELEPHONE BATTERIES

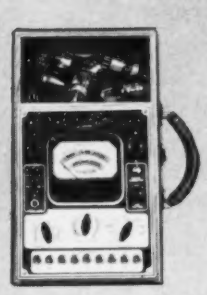
THE ELECTRIC STORAGE BATTERY CO.
Philadelphia
The World's Largest Manufacturers of Storage Batteries for Every Purpose
Exide Batteries of Canada, Limited, Toronto

XUM

Sure there are WESTONS for those special measurement needs!

HERE are just five of them. WESTON makes many more. Each designed to meet some particular measurement problem . . . make test procedure simple . . . less time-consuming . . . more efficient. Remember this whenever you are faced with some new or unusual measurement problem. Better yet . . . investigate these WESTON instruments *now* . . . for chances are that one or more will exactly meet your *present* needs. Consult the WESTON representative in your vicinity, or write Weston Electrical Instrument Corporation, 576 Frelinghuysen Avenue, Newark, N. J.

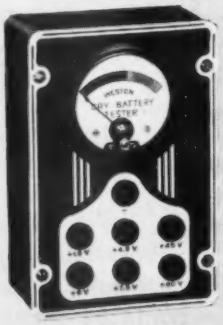
Ultra High Frequency Oscillator—for checking and testing all types of communication equipment and carrier current systems operating in the high frequency bands. Has fundamental frequency coverage from 22 to 150 megacycles. Tests can be made with or without direct wire connection. Employs continuously variable inductive tuning, which provides high order of stability and resetability over entire range. Extremely portable, measuring only 8" x 8" x 11"—self contained power supply.



Tubechecker—for checking commercial radio tubes used in telephone circuits. Tests tubes with filament voltages ranging from 1½ to 117 volts. Provides short check and cathode leakage test. Operates on 110 volt AC. Compact, light weight.

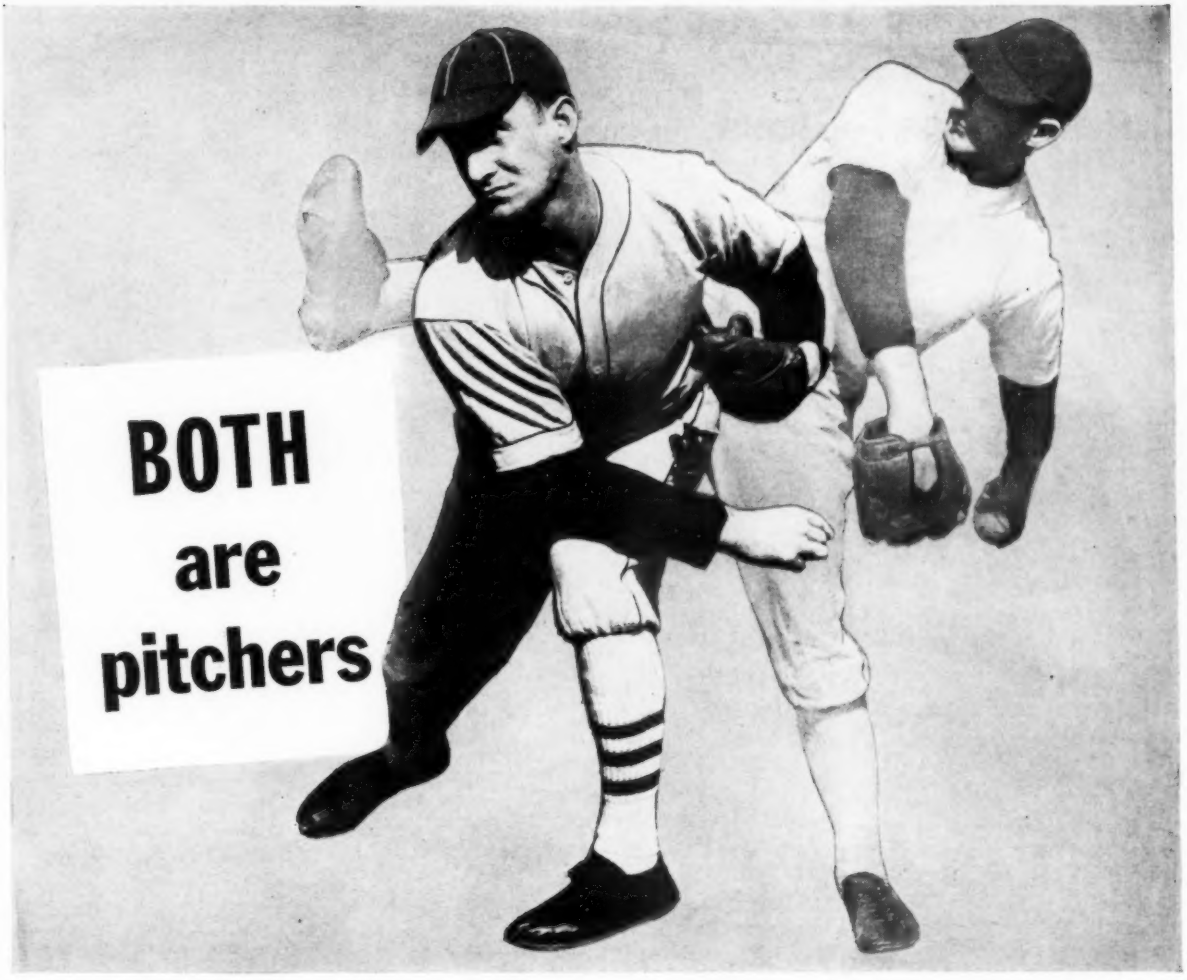
Pocket Size Testers—Real WESTON ruggedness and dependability in a complete line of compact maintenance instruments. Model 564 illustrated is a Volt-Ohmmeter with wide selection of voltage and resistance ranges. Self contained battery.

Industrial Circuit Tester—provides new convenience in testing signal, control and electronic circuits. Has 27 voltage, current and resistance ranges. High sensitivity for testing photo-cell, vacuum tube and relay circuits, and other plant maintenance and production requirements.



Pocket-size Dry Battery Tester—Measures "cut-off" voltages under proper load conditions. Ideal for checking dry batteries used in manufacturing or industrial control circuits. Ranges for testing batteries of following voltages . . . 1.5–4.5–6–7.5–45 and 90 volts.

WESTON *Instruments*



Developed and constantly improved *in the world's greatest battery laboratory, the "Eveready" "Columbia" "Gray Label" Long Life telephone cell combines long life and rock-bottom economy together with the sustained voltage characteristics for which "Eveready" telephone cells have always been famous.*

...but ONE is a CHAMPION!

It's extra "stuff" that makes the difference!

It is no accident that "Eveready" "Columbia" "Gray Label" Long Life telephone cells are the overwhelming choice of many men who have spent years in the telephone business.

These cells are famous for the quality that spells consistent, dependable performance—every time. Users know that they are made of good "stuff" through and through, because their voltage characteristics are always uniform—never erratic. That's because every cell is built to a single standard of top-flight materials through controlled manufacturing methods.

To improve or maintain high service standards and to insure continued subscriber satisfaction, use "Eveready" "Columbia" "Gray Label" Long Life telephone cells. You can always count on them to deliver!

CHAMPION FOR THREE REASONS

1. **LONGER LIFE.** More economical . . . give you many extra hours of service life.
2. **SUSTAINED VOLTAGE.** Means improved transmission efficiency.
3. **UNIFORM QUALITY.** Every cell identical... built to a single standard of highest quality.

NATIONAL CARBON COMPANY, INC.
General Offices: New York, N. Y.
Branches: Chicago and San Francisco
Unit of Union Carbide and Carbon Corporation
UCC

The words "Eveready", "Columbia" and "Gray Label" are trade-marks of National Carbon Company, Inc.

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Only PHILCO gives you Floté in Steel-Glass BATTERIES

No Low Cells!

Entirely new principle of construction, exclusive with Philco, eliminates low cells and costly maintenance. Let our engineers help solve your problems—write

PHILCO, Battery Division
Philadelphia, Pa.

REPAIRS NEEDED!

MAKE THEM WITH

Nicopress

REPAIR SLEEVES and *Nicopress* TOOLS

Whenever it is necessary to cut out old line splices, there is no method of re-splicing that equals the use of Nicopress Repair Sleeves.

These sleeves will maintain your initial sag and do away with a lot of additional labor required in doing the work by ordinary methods, and save greatly in material and time. You eliminate entirely the "cutting-in" of new sections of wire.

Nicopress Repair Splices are quickly made by pushing long side of sleeve on one wire end until sleeve clears other wire end, then pulling back sleeve over other wire end until it meets the stop. Then make your compressions.

The completed splice will equal or exceed the rated breaking strength of conductor and conductors will not pull out. Start saving on your repair jobs now . . . . order Nicopress Repair Sleeves from your dealer.

THE NATIONAL TELEPHONE SUPPLY CO.
5100 SUPERIOR AVE. — CLEVELAND, OHIO
Canadian Mfr.—N. Slater Co., Lt'd., Hamilton, Ont.
Export Distributor—International Standard Electric Corp., New York, N. Y.

MAKE IT A NATIONAL *Nicopress* SPLICE

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CABLE PLANS

For the Small Exchange

By JAY G. MITCHELL

***WHEN IT BECOMES** necessary to replace open-wire plant with cable, a cabling plan and layout should be prepared. With such a plan, the work may proceed in successive stages with the assurance that the separate portions will merge into a well-engineered and complete job. Construction plans should consider possible future development of town, it is pointed out in this first instalment of a series*

SUCCESSFUL management of the small telephone exchange involves, of course, the same economic factors as the larger exchange but many elements of plant design lend themselves readily to somewhat simpler treatment in such exchanges than they require in the larger.

When open wire becomes costly to maintain, when municipal authorities order pole lines removed, when streets are widened, when city pole lines call for replacement because of age or for other reasons, it becomes advisable to accord careful consideration to the replacement of open wire with cable. Such consideration includes, of course, a study of the cost of the proposed new construction, and the determination of the cost involves the preparation of a cabling plan and layout.

Such a plan should be developed whenever any open-wire construction is to be replaced by cable, even if it is not contemplated that the entire installation of all the cable is to be carried to completion at once. It is possible, in such cases, to inaugurate a comprehensive program looking to the ultimate elimination of all open wire in the city limits without any interference with the final and succeeding steps of the complete undertaking, provided the entire situation has been carefully studied and reduced to a final result in the form of a plan.

When this has been done the work may proceed in successive stages with the assurance that the separate portions will finally merge into a well-engineered and complete job.

"Any proposed cabling plan must be worked out in detail in advance of the placing of any orders for material," states J. G. MITCHELL. "This is because changes are not readily made during the progress of the actual construction without incurring risk of greatly increased costs."

In any plan involving the use of cable it is necessary to make careful studies of the probable demands for service in the future as well as to measure the facilities required to supply existing service when the open wire shall have been replaced. The first step, therefore, is the preparation of a map of the municipality which will show all streets, alleys, streams and railroads in the area that is to be served by the proposed cable.

This map should be carefully drawn on a large scale so that individual building lots are shown. Such a map is important during the preparation of the proposed cable layout. It becomes of great importance later, when the completed cable installation shall have been drawn in, as an office record to be used in locating trouble, the assignment of cable pairs and other purposes incidental to the management of the exchange.

On this map should be shown the location of the central office as the first step in working out the proposed cable layout. This is important because one of the incidental factors may be found to be the necessity of considering a change in the location of the central office in order to place it more nearly at the "wire center" of the exchange area. When the removal of the central office to a more advantageous location does not involve any more expense than a change from one rented location to another, it may be found to be economical and advisable to make the change.

Such a condition may have arisen because the growth of the city has been in directions different than was expected when the telephone exchange was established or because the exchange was not, from the standpoint of the experienced demands for service, centrally located in the first place.

Of course, when the central office is a permanent and well-built structure, expressly erected for telephone exchange purposes, then a change in location should not be lightly decided upon. Even then, however, the location of the central office enters into the plan for cabling any city because if common battery manual or dial equipment is used or is contemplated, the length of the average subscriber's loop assumes an important place in the plan.

Having prepared a map the next step is to indicate the present subscribers on the individual building lots. In many telephone offices this

XUM

information is available in the form of existing records. After the present subscribers have been entered on the map, then on the building lots where no service has yet been established (this means vacant lots and lots occupied by buildings in which no service is being furnished) the probable number of future subscribers should be entered.

In making this estimate of future service development there must be considered the trend of the city's growth, the character of the neighborhood, the obstruction to settlement by streams, railroads and swamps, the location of projected factories and other large buildings, and the present and future locations of airports, bus depots and railroad stations. The prime object of this part of the study is to lay the foundation for the determination of the probable future need for cable pairs, over and above the pairs required for present service, in each portion of the central office local service area for some years in advance.

It is obvious that this part of the study requires the most careful and painstaking work. This is because cable pairs must be provided when and where there is a demand for present service as well as where there is likely to be a demand for service in the future, while the provision of an excess capacity in cable pairs involves an investment which can not be made productive. Unlike crossarms and open wire the capacity in circuits of finished cable is limited and additional circuits may not be readily added.

In the accompanying map of an imaginary town, the location of the present central office is shown at "B" with a possible alternative location at "A." The figures in each building lot indicate the probable total number of subscribers, including present installations, that may reasonably be expected to demand service in the next year. In one block along both sides of Main Street, for example, there are stores on the ground floor and offices for doctors, dentists, lawyers, beauty shops and tailors on the other floors.

Thus the total number of cable pairs required to serve subscribers on these lots can be estimated. The numbers in the several building lots are marked "R" for residence service and "B" for business. On the other streets the number of subscribers (present and prospective) is indicated in the same way.

It should be emphasized that an estimate of this kind is based upon the number of subscribers *per lot* and not upon the completed buildings. A vacant lot is a likely place for the erection of a house or business building at some time in the future and when this occurs it is to be rated as likely to produce a demand for service.

The next step is to compute the number of cable pairs that may reasonably be assigned to each of the several blocks. It is permissible to assume that one cable pair will be required, in a residential district, for 1½ subscribers if party-line residential service is being furnished or is contemplated. In the business districts, however, it is more conservative to assume that one cable pair will be required for one subscriber although the sale of business party-line service will slightly increase the number of business subscribers that may be served by one cable pair on the average.

Assuming 1½ average residential subscribers and one business subscriber per cable pair, it may be readily seen that the cabling layout for the imaginary central office shown in the map will require the following total cable pairs entering the main distributing frame:

For actual present service—
26 Residence subscribers
18 cable pairs
37 Business subscribers
37 cable pairs

On the map it will be noted that there are eight rural circuits going out North Tilton Street, 10 rural circuits and six toll circuits going out Main Street and four rural circuits and four toll circuits going out South Tilton Street. Assuming that the toll circuits are to be brought into the central office through the cable, the rural and toll circuits will require the following cable pairs:

8 rural out North Tilton Street
10 rural out West Main Street
4 rural out South Tilton Street
6 toll out West Main Street
4 toll out South Tilton Street

At this stage of the study it is seen that the total number of cable pairs that must be provided into the central office is:

55 pairs for local service
32 pairs for rural and toll service
87 pairs total

It is conservative to keep the cable fill at the central office at or below 80 per cent of the total number of pairs entering the office. So the number of cable pairs that should conservatively be provided into our imaginary central office is 87 divided by 80 or 110 pairs. In all probability it would be found economical to install at least 125-pair cable leading into the main distributing frame under the conditions shown by the map.

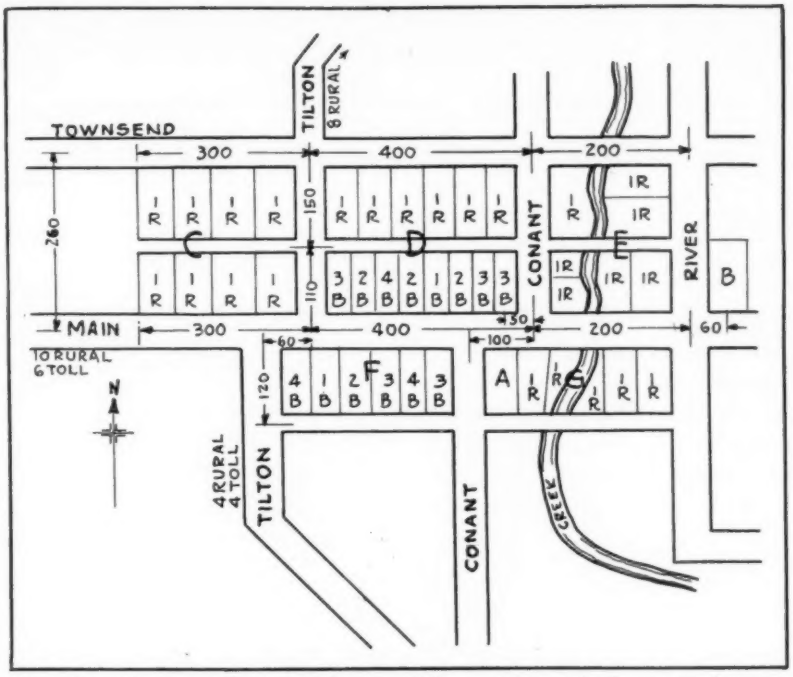
After determining the number of cable pairs that must be provided at the central office it is necessary to consider the method to be used in the construction of the outside cable plant. In many offices the entire new cable can be supported on poles from the extreme outside cable terminals into the central office. In others, the policy of the telephone company, municipal requirements, projected new pavements, change in the location of the central office, difficulty in securing tree-trimming privileges, changes in street lines and other similar considerations, may indicate the advisability of installing all or a portion of the cable underground.

In such cases careful study is essential because the plan selected affects the total cost of the project and, therefore, the general scheme of distribution, the kind and amount of cable to be ordered and the amount of plant retirements that will result. It may, in some cases, dictate a change in the location of the central office if underground cable is to be installed when no such change would be indicated if aerial cable were used exclusively.

It is probable that three separate studies will be required before the final decision as to the extent to which underground cable and aerial cable may be used can be made. The first may well be based on the plan of aerial distribution exclusively, the second on the use of underground cable in the business section of the community and aerial cable from the outer limits of the underground to the open wire, and the third on the use of underground distribution throughout the entire community.

In most cases it is believed that the second plan will be the most feasible for the small telephone exchange but it is definitely advisable to make plans for the proposed cable work on all three bases, because the relative cost and other factors will have to be given executive consideration before the work can be started. Any proposed cabling plan must be worked out in detail in advance of the placing of any orders for material. This is because changes are not readily made during the progress of the actual construction without incurring risk of greatly increased costs.

In the plan for the use of aerial cable throughout, the first item for consideration is the suitability, as to type and location, of existing pole lines for cable supports. Possibly



Map of imaginary town showing the location of the present central office at "B" (extreme right) with a possible alternative location at "A." A study of this map with the text will show how an estimate can be made of the total number of cable pairs required to serve subscribers in the several building lots which are marked "R" for residence service and "B" for business.

the municipality has ordered all overhead wire structures removed from the main streets. This is often the primary reason, as a matter of fact, why cable construction is considered. In such cases the aerial cable serving such streets must be brought into the central office on new pole lines. Alley construction or construction on private right of way must be considered.

When the situation does not require the removal of existing pole lines from the streets it is often impossible to plan on their re-use for aerial cable because of size and location, even when they are in satisfactory condition from the standpoint of depreciation. It is often advisable, incidentally, for the telephone company to retain its pole lines in the streets if possible as a means of preserving the right of way for future need.

In general, it is recommended when aerial cable is to be used that the setting of new poles for the cable supports be given thorough consideration. This is primarily due to the probable old age and large size of the existing poles, considered as cable supports, and also to the fact that suitable new poles may be selected on the basis of uniformity in size and appearance.

In the study of the plan calling for the use of underground distribution in the business part of the community and aerial cable from the end of the underground to the open wire, the same consideration must be given as to the use of existing pole lines or to their replacement by newer and lighter structures as cable supports. In this plan there may be existing underground conduit which, if in satisfactory condition, would of course be used.

When it is necessary to install new underground conduit several factors assume importance. The first step is the determination of the locations of the manholes and handholes on the map. Manholes will preferably be located at street intersections. Vitrified clay conduit or some one of the several types of fiber duct may be used. This is mentioned because the distances between manholes should be fixed with the lengths of the duct sections in mind.

A very important thing is to so locate the manholes that branch conduit, for underground runs down cross streets, may be readily laid if required at once or later. In laying conduit between manholes it is very important that it be given a constant and substantial pitch, when the street is level, from the middle of the section toward the manholes at the ends.

In the business section at least one run of lateral conduit should be installed leading from each manhole to the location of a cable terminal or distributing pole to insure that cables for service to neighboring subscribers may be pulled in as required. It must be constantly kept in mind that in underground distribution access to the cable in the conduit must be provided from both sides of the street, in the initial installation of the conduit.

Failure to provide for such access for neighborhood distribution will entail difficult and costly construction later. For this reason the importance of providing lateral conduit cannot be overemphasized. In aerial cable distribution it is always possible to install terminals as needed; but without plenty of lateral conduit runs in underground construction for every possible service demand, access to idle or available cable pairs may become very difficult or costly.

The author knows of a small telephone exchange in which two men, owners of the plant, dug the trench, laid the conduit and built the manholes throughout the entire business part of their community in one summer with the most satisfactory results.

When the underground installation is completed it should be accurately platted to scale on large scale maps for future use when other underground structures, such as electric light conduit, water mains and sewers, are to be placed.

While it is not by any means an accepted rule it is believed by many authorities that no less than four ducts should be laid in any underground main conduit run. This is true even though the initial requirement does not call for that number. The increased cost of four ducts over less than four is slight when compared with the cost of tearing up the street later and installing additional runs to provide facilities for municipal cables, toll cables and other likely or possible contingencies.

(Second article to appear soon)

No Public Telephone Available in Iowa Town

The Federal Communications Commission recently received a letter from a resident of an Iowa town stating that there is no public telephone service locally available. As a matter of public interest, the commission requested the local telephone company to look into the situation.

XUM

A CABLEMAN TALKS

Of the Art of Soldering

By JOHN BONERT

CABLE SPLICERS and helpers, experienced in wiping joints on lead cable, realize that the skill required to make joints tight and neat-appearing is acquired only by patient and careful practice. Part I of this article clearly describes the various steps necessary in wiping a joint—from the preparation of the solder to the proper care of the wiping cloths

EVER SINCE the first wiped joint was made on lead cables, it has been the ambition of every cable splicer and his helper to master this art. A man must be skilled to wipe a joint that will be pressure tight and well appearing. This skill is acquired only after patient and careful practice. The importance of wiping may be exaggerated by some, but nevertheless it is an accomplishment of which every good cable splicer is proud.

The actual wiping of a joint cannot be learned by reading text; but through reading, the learner can acquire some helpful information that will make clear the various steps. To become a proficient wiper, a man must observe and carefully study every move that he makes when handling the metal and wiping cloths. The man with patience, who has the ability to keep from getting excited, and makes haste slowly, usually becomes a good wiper much sooner than the man who does not have these qualities.

The student should first learn to judge solder so he can determine the proportion of lead and tin it contains, also to detect the presence of foreign metals. The ability to read solder samples comes only by experience. Wiping solder is usually a mixture with a proportion of 62 per cent lead and 38 per cent tin.

The repeated heating of the metal and constant wiping gradually reduces the percentage of tin and the metal becomes what is known as "coarse." The use of such metal will often result in a porous joint. This makes it necessary to add more tin (50-50 bar solder can be used for this purpose). There are several reasons for this loss of tin:

(1) Overheating the metal.

(2) When pouring the metal on lead cable and sleeve to heat the joint, small particles of lead are often melted from the cable sheathing and sleeve if the metal is too hot. This lead naturally is mixed with the metal that is again put back into the solder pot.

(3) The percentage of tin can also be reduced if the metal is not stirred occasionally. As the specific gravity of lead is greater than tin, most of the tin rises to the surface. A large percentage is removed from the pot because, when wiping, the ladle is seldom dipped to the bottom of the pot to obtain solder.

Although the cable splicer has no exact means of testing his solder, he gets very good results from the following method. The quality of the metal is judged by its appearance when cold. A small quantity is poured out on a level surface, such as brick or concrete and, after it cools, the surface of the metal is examined for bright spots. Pour enough to make two or three pieces about the size of a silver half-dollar.

Solder should never be tested on a flat metal surface, for this will give a false reading. Solder poured on an iron or steel surface chills almost instantly and will show bright, even if it is quite coarse. The best reading is procured by using a building brick as on this surface the sample cools slowly. If possible, readings of solder should always be taken by using the same surface. The use of red building brick gives the best results.

When testing metal, be sure to stir the pot before pouring samples. The ladle must be heated before dipping it in the solder. Lead and solder must be dry before being added to metal in a pot.

Good wiping solder should show four or five bright spots, about $\frac{1}{8}$ or $\frac{3}{16}$ of an inch in diameter. It should also appear bright around the edges. The side of the sample that was in contact with the brick will not be bright. If the metal shows too white or chalky, it is coarse and needs tin; if too many bright spots appear, it is too fine and requires more lead.

Metal that is too fine will chill very quickly at the edges of the joint when wiping and, consequently, the edges cannot be wiped clean. If solder is coarse or contains a foreign metal, it will appear sandy. With such a mixture, the bottom of the joint will have a tendency to fall out before it can be finished. A joint wiped with such metal is quite apt to leak under gas pressure, as the particles do not lie in so close relation to one another and the result is a porous joint. Foreign metals, such as zinc or antimony, in the solder will show chalky with numerous small bright spots.

We can understand how the quality of the wiping solder could be lowered by the use of antimony

FRONT COVER

Perched high on a telephone pole on a hill in San Francisco, Calif., the young lineman shown on the front cover concentrated on his work as the camera recorded one of the many day-to-day operations in the telephone business. He is employed by the Pacific Telephone & Telegraph Co.

Anyone who has been in San Francisco recalls how steep some of the hills are, and they present special problems of maintenance and require extra safety precautions, in many instances. But it is all in the day's work to the lineman to climb poles, whether on a hill or on level ground. His job is to keep the lines in order so that telephone service will be good.

sheathing for tempering the metal. Pure pig lead should be used for tempering if the metal is too fine instead of lead antimony sheathing from cable.

There will be a question in the minds of most men as to how zinc might find its way into the solder pot. This is apt to occur only in cases where men tin or wipe on brass nipples. If a nipple is tinned by dipping it into solder, or by pouring on nipple over solder pot, there is danger of overheating the brass and releasing a small amount of the zinc, as brass is a composition of copper and zinc.

Great care should be taken never to allow brass filings to get into the solder pot. If solder is very hot when wiping on brass, the tin will be burned off and this will also allow some zinc to become mixed with the wiping solder.

Before going further into the subject, the student should know something about melting temperatures of the metals used for wiping cable joints. The melting point of zinc should also be known. These figures will not be of much use to the beginner, other than to give him an idea of what really happens when wiping solder is overheated.

The following table has been worked out by one of the best authorities on metals:

Two parts lead and one part tin melt at 475° F.
One part lead and one part tin melt at 390° F.
Tin melts at 450° F.
Lead melts at 621° F.
Zinc melts at 773° F.
Tin makes putty powder at 428° F.
Lead oxidizes at 612° F.

Solder is hot enough for wiping at 600° F. This heat, of course, must sometimes be exceeded, as in the case where a large joint is to be wiped, so that the heat of the pot would not be exhausted before the joint could be finished. From the foregoing table it can be seen that zinc in the solder would not melt and, therefore, could never be burned out of the pot.

To remove zinc it would be necessary to heat the metal to about 800° F. and throw in a piece of sulphur (resin can also be used), stirring it well. This brings to the surface lead oxide, putty powder, sulphur and the zinc, which can then be skimmed off. After the metal cools to normal wiping temperature tin can be added to make up the loss through overheating. The metal should never be allowed to get red hot as it is then at least at a temperature of 1000 to 1100° F.

We can now understand why the metal becomes coarse through repeated overheating. If tin makes putty powder at 428° and lead oxidizes at 612°, we know what happens when the metal is allowed to get red hot, for it is then about 500° hotter than it should be and a larger percentage of tin will be burned up.

The cable splicer has no scientific means for testing the temperature of his metal so he has to rely on two simple tests. When heating the solder, it will be noticed that the color of the surface changes. At first a light straw color will be seen; this will run to a purple tint and then to a lead grey. The heat under the pot should be reduced when the solder takes on this color.

The cable man can also test the solder for heat by folding a piece of newspaper, about six inches square, to the shape of a stick. This should be dipped into the solder and taken out very quickly. The metal is hot enough if the paper is charred, but too hot if the paper is actually burned black.

The end of this paper stick which is held in the hand must be folded over to close any passage from the end that is dipped into the solder pot. The reason for this precaution is that the paper is sometimes moist enough to make steam, which will force a small amount of solder up through the paper and burn the hands. This test can also be made with a thin stick of wood.

Too much importance cannot be laid on the care of the wiping solder.

Tools Used for Joint Wiping

We have all heard the expression, "A good mechanic is judged by his tools." Although this cannot be said of every good cable splicer, it is very evident that a man who can do a good job with poor tools certainly could do it better and with less effort by using good tools. Neglect of tools is a bad habit which is easily acquired. A man should always keep the fact in mind that "Bad habits grow wild but good habits must be cultivated."

The following is a list of tools that are necessary for the all-around wiping work of the average cable splicer:

Catch cloth, 6 ins. by 8 ins.; catch cloth, 5 ins. by 6 ins.; finishing cloth, 3½ ins. by 3½ ins.; finishing cloth, formed 2½ ins. by 2½ ins.; crotch cloth, 8 ins. long; crotch cloth 4 ins. long; small mirror, solder ladle and solder pot.

Special Notice Regarding "Prize Letter" Contest!

So many contributions have been received in "prize letter" contest on the subject, "What TELEPHONY, The Journal of the Telephone Industry, Means to Me," that we are obliged to postpone the final judging of all entries.

TELEPHONY will announce the winners as soon as a fair, careful analysis can be made of the many excellent contributions submitted. The contest closed April 15 and names of prize-winners were to be announced in the April 27 issue, but the many meritorious entries received at the last moment compels the postponement in fairness to all.

In addition to these tools, the splicer should provide himself with a crotch stick about ⅜ in. by ¼ in. by 7 ins. This stick may be made of hickory or maple, either of which is a hard wood and suitable for this purpose. A piece of cotton-covered wire not heavier than No. 22 gauge and about 12 inches long, for cutting out crotches, completes the list of tools needed.

The splicer should also have at hand some newspaper or cardboard to place in the drip pan. The wiping cloths should be made of the finest grade of herring-bone ticking.

Wiping cloths should be broken in with care. The life of a cloth is prolonged if this is done properly. To break in a catch cloth, stearine is applied by rubbing it on the surface of the cloth. The cloth is then held over heat (never hold cloth in flame or furnace) which melts the stearine. The cloth will now soak up the melted stearine. This is repeated until the cloth has absorbed enough stearine to prevent the solder sticking to the cloth when wiping. Crotch cloths can be treated in the same way.

After the cloth has been prepared in this way it is ready to work with, but a little stearine applied occasionally will improve the cloth. The cloth should not be thoroughly soaked with stearine as the heat, when wiping, will go through the cloth and the cloth will become too hot for the hand.

The finishing cloth is prepared for use by the same method as the catch cloth except that between each application of stearine it is rubbed on a smooth piece of cable or a lead sleeve. This rubbing smooths down

(Concluded on page 50)

XUM

in the Nation's Capital

by Francis X. Welch

Special Washington, D. C., Correspondent for TELEPHONY

AN INTERESTING LEGAL question is raised in the possibility of the FCC acting as arbitrator in the division of toll revenues. . . . Logan-Walter bill, now in Senate after passage by House, is of great importance to the telephone business. . . . Bill has fighting chance of passage if sufficient public support can be had to impress Senators

ON APRIL 15 the FCC announced that tariff schedules containing the recent long distance telephone toll rate cut of $5,300,000 a year had been filed by the AT&T. This reduction, which had been announced earlier this year after conferences between the company and the FCC, has resulted in a renewal of uncertainty on the part of the Independent telephone companies. The latter are beginning to wonder just what recognition they should be entitled to have on the subject of the division of toll charges.

The fact that the FCC itself is sensitive to the reasonable criticism that the interests of the Independent companies should not be foreclosed behind their backs, in private negotiations of which they have no notice and in which they have no voice, is more amply discussed elsewhere in this issue of TELEPHONY.

The suggestion that the FCC should assume the role of arbitrating any differences between the Bell and Independent companies in the matter of division of toll revenues raises a rather nice legal question. The question is this: Does the FCC already have ample statutory jurisdiction to go into the matter of toll division, on its own motion or upon complaint? (The question assumes that the FCC also has sufficient funds and a regulatory disposition to do so.)

When we read section 2(b)(2) of the Communications Act of 1934 and the other pertinent sections (from 201 to 205) which limit the jurisdictional status of FCC over the Independent companies, we get a general impression that the FCC probably does have broad and complete jurisdiction over the fixing of rates for interstate telephone service. Furthermore, this first reading would probably give us (layman and lawyer alike) the impression that this jurisdiction would extend to the division of toll charges between connecting companies whether Bell or Independent.

BUT THERE is still doubt about the matter even in the mind of the FCC. Why otherwise would the FCC in its recent report to Congress on the special telephone investigation make as its third recommendation for specific legislation the proposal that Congress should "amend section 201(a) of the Communications Act to clarify this commission's jurisdiction over the division of joint interstate rates per se. As the section stands it might be contended that the jurisdiction of the commission is limited in this connection to those instances wherein a physical connection has been ordered by the commission"?

Commissioner Walker's proposed report on the telephone investigation contained a similar recommendation.

This does not mean, of course, that the FCC would take the position (if the question were raised in an appropriate proceeding before it) that it has no jurisdiction under the existing law to divide toll rates between Bell and Independents. On the contrary, the FCC could be expected to take the opposite point of view. Furthermore, it is exceedingly doubtful whether the AT&T itself, under such circumstances, would even raise a jurisdictional defense.

Your correspondent has made inquiry in legal circles and examined regulatory literature and has found surprisingly little written on the subject. It is understood, on pretty good authority, that a memorandum was prepared by the FCC's special staff which concluded that the commission had full jurisdiction in the premises. This was completed during the special telephone investigation, but for some reason or another it did not find its way into the final report.

One can, of course, find much analogous legal discussion on the subject of ICC jurisdiction over joint railroad rates. There has even been discussion about FPC jurisdiction over intercompany charges for electric power moving in interstate commerce. But such analogous treatment is not trustworthy.

The ICC jurisdiction over railroad rates, by virtue of a trend of U. S. Supreme Court decisions which started with the celebrated Shreveport case many years ago, has reached such a point that the

ICC can do pretty much what it pleases, not only about interstate railroad rates but intrastate railroad rates as well.

It was by very reason of this invasion of federal regulatory jurisdiction (which reduced the authority of the state commissions over intrastate railroad operations to a hollow shell) that the National Association of Railroad & Utilities Commissioners got busy and saw to it that statutory language which would result in an application of the so-called "Shreveport doctrine" was kept out of the Communications Act of 1934 and the Federal Power Act of 1935, and the Natural Gas Act of 1938.

So, it would be safer to consider this Communications Act of 1934 within the four corners of its own documentary existence. Your correspondent has done this and arrives at the following purely personal conclusions:

(1) That the FCC has no jurisdiction over the division of tolls between Bell and Independent companies as to handling of long distance messages which move over intrastate toll lines. (This, incidentally, would cover a considerable portion of the Bell-Independent toll business, which is short haul and suburban in character.)

(2) The FCC, under the general implications of the provisions contained in sections 203, 204 and 205, probably has jurisdiction to determine the reasonableness of interstate long distance rates charged by Bell companies, *which would include a determination of the reasonableness of all cost elements entering into such charges*—in other words, what the Bell System would be allowed to charge against operating expenses for the reasonable cost of compensating connecting companies. (This does not mean that the FCC would have the right to make the Independents *accept* such compensation.)

(3) Under a strict interpretation of section 201(a), the FCC has no jurisdiction to fix the reasonableness of the division of charges for interstate telephone messages jointly handled by Bell and Independent companies, except in those cases where physical connection has been established by order of the commission. However, under a more liberal interpretation of this section (which would include a consideration of the commission's power over contracts between Bell companies and carriers not subject to the Act) an attempt by the FCC to fix interstate telephone toll rates *per se*, right down past the switchboard of an Independent participating company, might be sustained.

It was this uncertainty about section 201(a) that led the FCC to make its recommendation to Congress that legislation should be enacted that would clarify the powers of the FCC.

Summing up the position of the Independent companies on this matter, your correspondent is led to the conclusion that while the FCC does not have plain jurisdiction to determine just how much Independent companies have to take for their services in participating in the handling of interstate toll calls, it does probably have jurisdiction to determine just what the Bell companies will be allowed to pay them if chargeable to operating expenses.

OF COURSE, this FCC jurisdiction over the Bell end of the business (which has never been exercised to date) would have to be based upon suitable findings and adequate evidence. That is where the practical part of the problem comes in.

The FCC does not have available the funds or manpower to undertake on its own initiative any exhaustive investigation of toll divisions, especially if the proceeding threatened to result in a bitter contest and court litigation. Under the circumstances, the FCC probably would be disposed to substitute, in place of such an exhaustive investigation of its own into the reasonableness of toll division, any apparently fair contractual agreements worked out by the Bell and Independent companies.

That is just your correspondent's own opinion. But it does seem only reasonable that the FCC would be most likely to approve any contract between the parties—mutually arrived at by fair arm's length negotiation, and which would leave everybody happy—rather than embark on an expedition in search of trouble on its own hook. The FCC has troubles enough right now with its problem children of radio, television, and so forth. If that hunch is correct, it would certainly seem to point in the direction of Bell and Independent feet getting together under the same table and talking it over sensibly.

REALLY, the most important thing to happen in Washington last week, from the viewpoint of regulated utilities, was the

"The Logan-Walter bill," declares FRANCIS X. WELCH, "is probably of more concern to all forms of regulated utilities than any other piece of general federal regulation since the New Deal attack upon the independence of the Supreme Court."

thumping big 3-to-1 majority which the House of Representatives gave to the Logan-Walter bill. This bill has already received attention in this department. Yet some telephone men with whom your correspondent has recently talked do not seem to realize just how it is of any concern to the telephone business.

Well, it is of concern. It is probably of more concern to all forms of regulated utilities than any other piece of general federal regulation since the New Deal attack upon the independence of the Supreme Court. It is of sufficient concern that telephone men, their employes and their friends, in the interest of the welfare of the industry, would be well advised to sit down right now and write their Senators a letter urging the passage of the Logan-Walter bill.

The chief purpose of this bill is to place a judicial check on our enormous federal bureaucracy. It is the outgrowth of slowly-generating alarm, felt in such responsible quarters as the American Bar Association, that federal boards and commissions are maneuvering themselves into such positions of power that they are becoming a law to themselves.

We recently saw an example of this right in the field of the FCC (which, incidentally, would come under the judicial checkrein of the

(Please turn to page 55)

XUM

"HOW TO DO IT"

In Building An Open-Wire Line

By RAY BLAIN

***THE SECRET OF** economical building of good open-wire lines is well-planned work with the various stages of construction carried out in their proper sequence. A system which utilizes all conditions to make a successful construction job possible, proves its value when properly-erected lines provide long years of service with a minimum of maintenance costs and of service interruptions*

"To provide a long life for the line only the best materials and approved construction methods should be used," says RAY BLAIN, who is thoroughly experienced in outside telephone plant construction and believes in doing a job well.

TELEPHONE construction men will argue among themselves about almost everything, but usually they agree that the construction of an open-wire pole line is a most interesting phase of their work. In order to construct economically a good open-wire line the work must be well planned and then the various stages of construction carried out in their proper sequence.

When a sufficient number of men is available this system is comparatively easy for each man has his particular work to perform at each pole, from the driving of the stake locating the hole to be dug until the last wire is tied in place to the insulator on the crossarm. This method saves lost motion caused by doubling back and is recommended when and where possible.

A small inexpensive transit is quite useful in laying out pole lines.

Small telephone companies, however, seldom have a sufficient number of men available to utilize this scheme. In such cases it is generally best to have certain jobs performed on one trip over the line and then complete the line on second or third trips.

For example, the first time over the route the holes may be located and dug; on the second trip the poles are set and the crossarms placed, and then finally the wire is strung and tied in place. In this article, an attempt will be made to describe methods by which this progressive type of construction may usually be best accomplished in any exchange under average conditions.

Ordinarily a line should be routed so as to cover the shortest distance between two points to be connected, except when a rural line must be run to reach a certain number of subscribers in the most economical manner. The proposed route of a line should be surveyed with care so as to provide the best tree clearance possible and to avoid running parallel with electric lines.

While the route of the line should be as direct as possible, its construction adjacent to highways to facilitate construction and maintenance might be advisable. Often the construction of a longer line will be justified when these advantages are given proper consideration.

When the line is surveyed, a stake should be driven in the exact center of each proposed hole location. These stakes should be accurately located by means of a transit or with the aid of suitable sighting poles; sighting poles will usually prove satisfactory on the average line. The distance between poles should be measured accurately by means of a surveyor's chain or a steel tape. The span length used in the past was ordinarily from 150 to 250 feet but with present-day high-strength wire spans of much greater length are being used successfully.

In general, a pole line should follow the contour of the ground over which it is to be constructed, avoiding insofar as possible all abrupt changes in grade that would place excessive strain on the wires at the insulators of the poles affected. Frequently spans of unequal length may be justified to provide a better grade of the line. Poles of various lengths may also be used to advantage in grading the line.

Corner poles should be located so that proper space for guying may be obtained. When the line parallels a highway it is usually best to have it located as near as possible to the fence line. It is not generally de-

sirable, however, to have crossarms extend over private property unless a proper right-of-way has been authorized. It is also sometimes practicable to place poles directly in the fence line so that they act as posts for the fence as well as poles for the line, when this may be arranged.

The placing of poles in locations which may be difficult to reach in wet weather should always be avoided. Poles should be located, when possible, so that the line wires will clear all trees by a satisfactory distance. Frequently it will prove desirable to cross a road and make one or even two corners to properly clear a group of trees. It is always much cheaper to clear trees when a line is being built than to keep the clearance trimmed for the life of the line. When corner poles are to be raked, they should be set in a proper distance to provide the rake required.

The pole material used will depend to a great extent on the section of the country in which the line is being constructed. The following trees are all considered as making good pole timber and are commonly used: Western red cedar, northern or eastern white cedar, chestnut, and creosoted yellow pine.

The southern yellow pine is always fully treated—that is, from roof to butt—and the others have only the butt treated. Poles may now be obtained from the supplier, roofed and gained at practically no increase in cost.

A standard number of gains may be cut and bored in the pole yard before being treated and shipped. This has a special advantage in the case of yellow pine poles in that all cuts will be properly protected during treatment. Also a better job is assured when poles are framed by well-trained men in the yard where proper tools are available than when the work is attempted out on the line with improvised methods.

The single-cut roof is now generally preferred by most construction authorities to the pointed roof. The top of the first gain is usually located eight inches below the tip of the roof, and the crossarms are usually placed on 12, 18 or 24-inch centers. The gains are ordinarily bored with 11/16-inch holes to accommodate the standard through bolts. All holes for special fixtures for guying should be bored while the poles are in the yard or on the ground before erection, when possible.

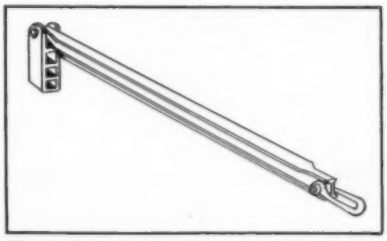
When a new pole line of considerable length is being built the poles are generally purchased in carload lots. The unloading of these poles from cars has ever been a difficult and dangerous task. The new steel-band type of load binding now makes possible a speedy and simple means of holding poles on cars for safe delivery.

Tensioned and sealed to form a large, secure unit these steel bands enable pole-users to reduce personal injury hazards, avoid delays and often serious losses in transit. Numerous fatal accidents which have occurred in the past in connection with pole unloading may now be avoided by the use of this simple and safe system.

When poles are received in carload lots, the car should first be spotted in a location where the track is level. The brake should be set and all of the car wheels securely blocked. Next, two steel rails, hinged at one end, are placed in stake pockets on the unloading side and raised by means of a rope or cable. This rope in turn should be snubbed around a good solid stake, wedged into the car truck.

When both rails are in position the steel bands at the top of the load used to hold the stakes together are removed. The unloading crew should never remain on the unloading side of the car after the stakes have been removed. While the other members of the crew hold the ropes which support the hinged rails, one workman cuts and removes the larger steel bands which encircle the load. These bands should be cut on the side opposite from the one on which the poles are to be unloaded.

Tension on the ropes should be eased off gradually until the hinged rails are in position to form skids



Sketch shows hinged 100-pound rail for fastening to stake pocket on side of freight car. This may be fabricated locally from old railroad rails.

The hinged rails are being lowered as the snubbed ropes are paid out to lower the load of poles to the ground.

This view shows how the hinged rails have been lowered to act as skids down which the poles are ready to be rolled onto the platform, and later hauled out on the line.

A speedy, efficient job of boring an anchor hole is accomplished with this earth-boring machine.

for the poles to roll down slowly from the car. It is now an easy matter to roll the poles on the ground or on a specially-built platform to support them a short distance above the ground.

A special tool may be procured for use in cutting the steel bands, if desired. This arrangement provides a most convenient and safe method of pole unloading that is rapidly gaining the favor of telephone men everywhere.

Poles are ordinarily loaded onto a suitable trailer and hauled to the job by a truck. In extremely rough country, it may be desirable to haul the poles on a horse-drawn wagon or by a tractor. It is always best not to drag poles on the ground for any distance, if it can possibly be avoided, for they may be seriously damaged.

The stakes used to locate the pole holes should also be marked to indicate the length of pole to be set in each location. This will assist the pole-haulers and insure the correct sized pole being placed at each location. It is always best to have poles on the ground before the holes are dug, if possible, as holes may then be properly sized for the poles to be set. Poles should be unloaded from trailers carefully to prevent breakage.

Care should be exercised in the digging of holes to make sure that the pole will have a free entrance and may be tamped all around for its total depth. There is always a natural tendency on the part of "grunts" to dig holes tapering from the top to the bottom. This should be avoided for it does not permit the proper alignment of the poles in the line; if anything, the hole should be larger at the bottom than at the top.

Holes should always be dug to the depth specified for a certain size of pole. The depth of a hole should in all cases be measured from the low side when a pole is to be located on the side of a hill. Ordinarily, a 20-foot pole is set to a depth of four feet; a 25-foot pole, five feet and a 35-foot pole, six feet. The mistake should never be made of setting a pole less than this or the strength of the line will be reduced considerably.

The best plan is to keep the pole-digging crew only a short distance ahead of the pole-setting crew as open holes are not only dangerous but often cave-in and partially fill with dirt if left for a long period of time. When holes must stand for some time, it is always best and safest to keep them well-covered. Short lengths of boards may be used for this purpose if a small amount of earth is placed on them.

It goes without saying that an earth-boring machine for hole-digging is most desirable for use on all large jobs where soil conditions will permit. These modern machines may be used also to dig anchor holes as they are arranged to be set at the proper angle. The earth-boring machine may be mounted on a truck or a tractor of the caterpillar type which is especially desirable for use in rough country as it may be more conveniently spotted at hole locations.

On small jobs and where earth-boring machines cannot be obtained, holes are ordinarily dug by hand with a long-handled shovel, spoon and digging bar. Some prefer to use also a loy or slick which consists of a tool steel blade 4 ins. by ½ inch attached to a wooden handle. Hand-type earth augers may be used to dig holes for the smaller-sized poles which do not have to be set to a great depth. The earth removed from a hole should be placed at one side and out of the way for pole-setting but convenient for use in refilling the hole.

The face of the pole is that side on which the gains are cut and the crossarms attached. On a straight line, poles should ordinarily face in opposite directions to equalize the strain. On curves or corners the poles should, in all cases, be faced so that the crossarm will pull against the pole. On a curve this can be accomplished by having all poles face toward the center point of the curve. On a single-pole corner the first pole on each side should face the corner pole. On a double-pole corner the two poles should also face each other. On extra long spans each pole should always face away from the span.

When crossarms are used, they should if possible be placed on the poles before the latter are set in the line as this may be best accomplished on the ground. The arms should be installed, the through bolts tightened, the arm lined up with a steel square and the lag screw driven in place. The lining-up of the arms on a pole while on the ground is never a difficult task; neither do the arms present any great difficulty in the erection of the poles.

When a bracket circuit or circuits are to be used, the brackets may also be nailed to the poles while they are on the ground. The fixtures, including eye-bolts for guying and even insulators, should be installed before the poles are erected as this will always save time. If crossarms, pins and braces are purchased separately, they should be assembled at the storeroom.

Ordinarily the poles should be delivered on the job before the holes are dug. Then the crossarms and

other pole hardware are delivered to each pole and installed with the least possible delay. Small parts should not be permitted to lie around loose as they may be easily lost. After the poles have all been assembled and located near the holes, they are ready to be set in the line and tamped in place.

There is no doubt that the pole derrick and a power winch provide the best means of pole erection. Not only is this method the safest but it also requires much less time and effort than any other. A pole derrick, however, is not always within the means of all telephone companies and some must resort to the old pike-pole method of pole-setting.

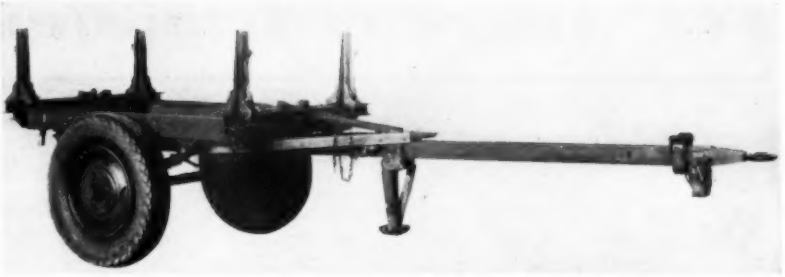
While this method is the oldest known, it is not generally considered safe. When, from necessity, this method must be used, it should be made as safe as possible by exercising close teamwork of the crew. All men must know their places and exactly what is expected of them in any emergency.

The pole should always be raised from the high side of the hole. Either a plank or a bar should be placed in the hole for the butt of the pole to slide on in order to prevent its plowing into the earth in the side of the hole. A "cant hook" should be used at the butt of the pole to prevent its turning while being elevated. A "dead man" or "jenny" should be used for the pole to rest on while pikes are being shifted.

If four pike poles are used, one only should be shifted at a time while the others steady the pole. The pike men should spread well out, fan-shaped, while the pole is being lifted to prevent its swinging or turning. The men with pikes should all lift together when they receive a signal. Care should be taken when the pole is elevated to its top position and starts to drop into the hole, for this is a dangerous spot in that the pole may jump to one side and fall before it has dropped into the hole a sufficient distance to hold.

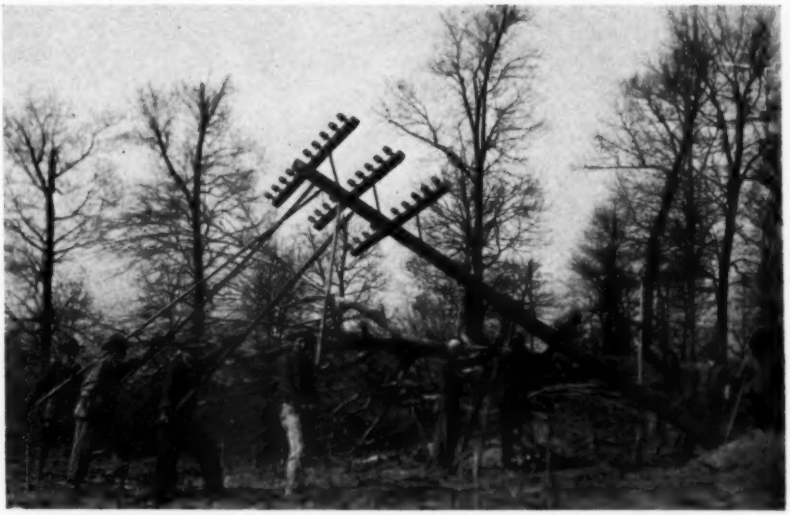
The pole should now be lined-up properly and held firmly in position with four grounded pike poles. The "cant hook" should be used to place the crossarm at right angles to the line. Care should be taken not to injure poles by damaging the treated surfaces with pike poles and cant hooks. The hole may now be filled with fine earth and well tamped in place. Care should be taken to tamp the hole well from the bottom to the top if the pole is expected to hold and keep in line. In rural sections

(Please turn to page 50)



This is one type of pole trailer satisfactorily used for conveying telephone poles.

This construction crew is raising a heavy pole with a line truck and derrick.



When erecting a pole with pike poles and a jenny every man must know his place and exactly what is expected of him. Note that crossarms and insulators are all in place.

FCC Aware of Importance of Fair Toll Division

WITH THE new toll rate reduction covering telephone calls over 420 miles in distance becoming effective May 1, the question of division of toll revenues between the Bell System and Independent connecting companies is uppermost in the minds of most telephone men.

TELEPHONY learns from exclusive inquiries conducted in Washington by its correspondent there, that the Federal Communications Commission is sympathetic with the position of Independent telephone companies and recognizes their needs and rights with relation to toll revenues. Furthermore, that the Federal Communications Commission is disposed to help the local connecting companies obtain a fair share of the revenue resulting from toll traffic, while at the same time protecting the public interest to the fullest extent.

Inasmuch as the latest rate cut, which takes effect next week, applies only to messages traveling 420 miles or more, it is felt that this minimum does not affect participating Independent companies substantially enough to be a really important factor in this particular reduction. However, this reduction—and all reductions—serves to bring the toll division question to the fore and focus the attention of all concerned on the necessity of its solution on a fair basis.

As will be remembered, in January Commissioner Paul A. Walker of the FCC announced that the Bell Long Lines Department could reduce its toll rates by about $10,000,000 a year. Negotiations followed, and on March 15 the announcement was made that the Bell had agreed to cut toll rates above the 420-mile distance to save the public $5,500,000 a year. This was accomplished through conferences between the FCC and the Bell and without a legal fight or an expensive investigation.

AS TELEPHONY'S editorial of March 30 pointed out, this agreement probably was advantageous to both parties—the commission showing a substantial saving for the toll users and the Bell System shaving the demanded $10,000,000 down to $5,500,000. Meanwhile, apparently, little thought was given the Independent connecting companies' interest in the case although, as stated, the 420-mile minimum will not affect them as substantially as other rate readjustments, of a more general nature, undoubtedly would.

In the course of time additional reductions in toll rates will probably be sought by the FCC—that being its mission, to serve the public—and some action should be taken to protect the interest of the Independent companies which act as joint partners in supplying toll service.

It is most encouraging to learn that the FCC understands the Independents' position in the toll service picture, and recognizes the justice of their claim to a fair division of the revenue. Responsible sources at Washington are known to feel that effective steps should be taken to present officially such claim and lead to its practical recognition. In short, that the FCC in dealing with the Bell System on toll cuts could with propriety protect Independent companies in their right to a fair division of toll revenues. This indicates that the commission, while dealing directly with only the Bell in past rate negotiations, does not overlook the fact that Independent companies also participate in the service and are entitled to consideration.

AN AUTHORITY in close touch with the FCC has suggested that the issue could be effectively raised by the Independents taking the matter up with the commission, charging that the division of toll revenues allowed them by the Bell System is inequitable, and that it varies widely in different parts of the country according to the arrangements made by the different Bell subsidiary companies. Then, it is said, the commission would be able to take steps to see that the conditions and rights of the Independents are protected.

Probably this would necessitate an increased appropriation for the commission, as it would entail more work and expense. The impression prevails in Washington circles that the commission is willing to safeguard the Independents' interests if furnished the money and clear authority to fix toll division. This runs true to the axiom that all government agencies desire more jurisdiction and power.

It is understood that the reason the FCC has dealt exclusively with the Bell in the matter of toll rates is because it is short of funds to finance an inquiry into all phases of the service — including Independents' participation—and closed its negotiations with the Bell on a conference basis on the grounds that the public interest demanded immediate relief.

There will be a difference of opinion as to the advisability of Congress giving more power to the FCC over toll division between Independents and the Bell. Probably most telephone men would prefer to deal with the Bell companies in their states than leave the matter to a government bureau whose principal purpose would be to reduce rates, with a very minor anxiety as to whether the operating company made a profit or a loss or broke even. It is also probable the Bell would not like to see the FCC take a hand in determining toll

(Concluded on page 50)

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3. Unequalled Flexibility.

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***PREVENTIVE MEASURES** for reducing "bowing" and "ring cutting" on aerial cable were given in paper presented before plant division at spring conference of National association. Correcting these two principal causes of line trouble will materially*

Extend the Life of Aerial Cable

By J. B. HALEY

CORRECTION of the causes of aerial cable trouble introduced by inherent characteristics of the cable and its supporting strand and rings in reaction to natural climatic conditions and changes, has been the subject of much field and laboratory study. A vast amount of data has been accumulated and many interesting facts have been learned. However, to us, vested as we are with the responsibility for judicious management of telephone property, the vital question is: What can be done to correct or minimize this condition?

With this question in mind an attempt will be made to outline the major causes and the remedial measures suggested for the elimination of such trouble.

"Bowing" and "Ring Cutting" Cause Much Cable Trouble

Briefly, the two main classifications of this type of trouble are "Bowing" and "Ring Cutting." Bowing refers to those bends, buckles or swoops occasioned in aerial cable by changes in temperature, i. e., contraction or expansion of the cable. Ring cutting is defined as the chafing or sawing of a cable sheath by its supporting rings.

To give some concrete idea of the forces under discussion, let us assume a 130-foot span of full size cable spliced in the normal manner, and with the further assumption that the cable could not bend or bow. At the time of splicing the temperature was 20° F., the compression force within the cable, of course, would be zero. Now let us view this cable at a temperature of 100° F. The compression force now exerted in the cable would be 1,000 pounds.

The two subjects — bowing and ring cutting—are closely allied, for the action of one aggravates the action of the other, and the cumulative effect is the rapid breakdown of the cable sheath. Repeated bowing or bonding of the cable produces fatigue of the sheath metal, and the pressure against the ring introduces cutting by the ring. The ring cut in turn weakens the sheath and causes a concentration of fatigue-producing stresses at the cut.

Some Common Faults in Cable Construction Methods

The more common faults in construction methods producing conditions conductive to bowing are:

(1) Placing strand at too high an initial tension.

(2) Improper tension splicing.

(3) Omission of grade clamps at corners and dead-ends.

(4) Failure to use cable straightener in pulling-in the cable.

(5) Hanging platforms on the strand without relieving a portion of the load by means of ladders.

(6) Pulling cable away from the strand while splicing, and pushing it back on completion of splice.

(7) Allowing long lengths of cable to lie in rings through periods of cold weather without using clamps to hold ends.

(8) Insufficient guying or improper anchorage for guys at corners and dead-ends.

The corrective measures necessary to reduce bowing are the converse of those faults just stated.

Now, with the elimination of bowing from our consideration, the question of ring cutting is somewhat simplified. The remaining problem is the elimination or damping of the vibrations between the cable and its supporting rings.

This condition is most acute at or near the pole and is usually pronounced on cables having their suspension strand attached to steel bridges.

Field tests have shown that under normal conditions ring cutting is severe at the first ring away from the pole, and that beyond the third ring its effect is negligible.

The outcome of these studies was the development of the cable shields and cable clips. The cable shield is a hard metal covering to be placed over the cable at points subject to severe chafing. It provides a wear-resistant surface at the points of contact between the cable and its supporting ring.

The cable clip consists of a pliable zinc band attached to hard-wire straps. With this type support the cable is securely held by the zinc band and any movement of the cable is transmitted to the hard-wire straps. The wear on the strand of these straps is negligible.

Cables supported by this type device have been inspected after 25 to 30 years of service. Although there was some cutting, the severity of the cut was less than half of that experienced on similar cables supported by standard cable rings for a period of five years. It is in the light of this experience that the preventive measures outlined are recommended.

Questions on Cable Construction and Maintenance

1. How may the proper tension of the strand be determined?

2. What tool is used to straighten cable after it has been pulled in?

3. What is meant by proper stringing tension?

4. How can bowing in existing cables be eliminated?

5. When is bowing most pronounced and at what time can its correction be effected?

6. What effects will be experienced if bowing is not corrected?

The answers to these questions will be found on page 44.

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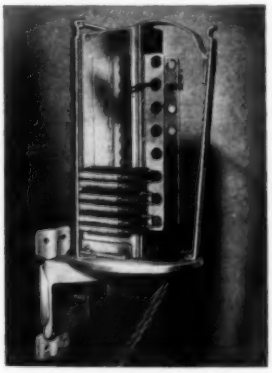

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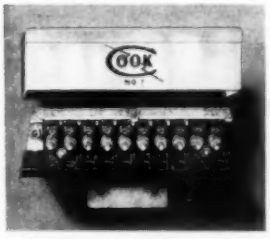

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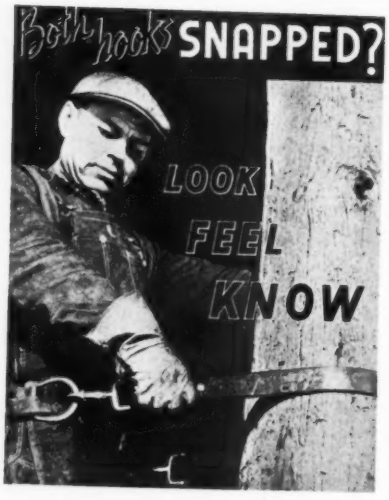
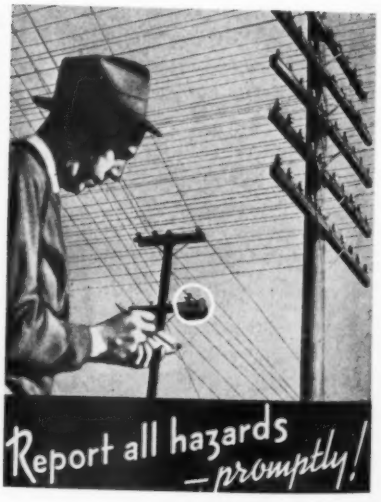
A Page of Safety Practices





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Resistance of Line Wire Splices

By R. EMERSON WALKER and R. TENISON WALKER

[EDITOR'S NOTE: The tests described in this article were made by two members of the senior class of Oregon State College at the request of Lowell E. Brown, Interurban Telephone Co., Silverton, Ore., who provided the necessary test specimens. Helpful suggestions pertaining to the method of test and to the preparation of this paper were made by Arthur L. Albert, professor of communication engineering at the Oregon State College.]

TESTS OF various specimens of sleeve and twisted wire splices show electrical superiority of sleeve splice over the twisted type

SINCE the adoption of splicing sleeves several years ago their use has increased principally because of the ease with which strong, weatherproof line splices can be made. The question of splice strength has been more or less satisfactorily answered by the lack of failures in the large number of applied sleeves. It is the purpose of this paper to compare the resistance of sleeve splices with that of conventional twisted wire splices.

When resistances of the order of several thousandths of an ohm are measured it is necessary to employ a means which eliminates the contact resistance between the test instrument and the test specimen. A Kelvin bridge is suited for this type of work because it is equipped with separate potential and current leads, and was used in making the tests to be described. The current leads were connected in all cases to the specimen at a point one inch from each end of the splice under test and the potential leads were connected at points farther out on the wire.

It is possible with the instrument

Splice	Type	Wire Condition	Service
A	Sleeve	New wire, filed ends	Splice made for test
B	Sleeve	New wire, scraped	Splice made for test
C	Sleeve	New wire	Splice made for test
D	Twisted	New wire	Splice made for test
E	"Farmer"	Old wire, rusted	Splice made for test
F	Sleeve	New wire	Splice made for test
G	Sleeve	New wire, scraped	Splice made for test
H	Twisted	New wire	Splice made for test
J	Sleeve	Old wire, rusty	Splice made for test
K	4 Sleeves	New wire	Splice made for test
L	Twisted	New wire	Splice made for test
M	Twisted	New and old wire	Splice made for test
N	Sleeve	New wire, scraped	Splice made for test
P_1	Sleeve	Field scraped	317 days
P_2	Sleeve	Field scraped	317 days
P_3	Sleeve	Field scraped	317 days
P_4	Sleeve	Field scraped	317 days
P_5	Sleeve	Field scraped	317 days
P_6	Twisted		Over 1 year
P_7	Twisted		Over 1 year
P_8	Twisted		Over 1 year
P_9	Twisted		Over 1 year
P_{10}	Twisted		Over 1 year

Table indicating type of splice, condition of wire and length of time in service.

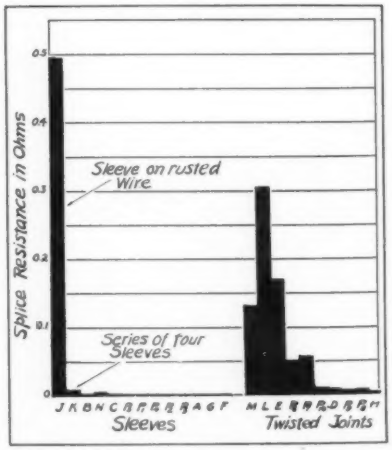
Splice	Splice Tension				
	0 lb.	25 lbs.	50 lbs.	75 lbs.	100 lbs.
A	0.0028825	0.002940	0.0029525	0.002950	0.0029575
B	.0052525	.0035025	.003580	.0035775	.0035875
C	.0038150	.0040725	.0042775	.0041275	.004195
D	.0084225	.009380	.0093125	.009145	.0043150
E	.181350	.20550	.189375	.171050	.09680
F	.002450	.002670	.002640	.002645	.0026325
G	.002560	.0026650	.0026550	.0026475	.002640
H	.005260	.0052825	.0053225	.00530	.00526
J	.46450	.5305	.4240	.49475	.4735
K	.0091775	.009270	.00931	.00930	.009290
L	.28925	.338625	.32525	.30575	.30825
M	.37325	.19950	.16200	.132125	.11650
N	.0052325	.005150	.005170	.0052275	.0052225
P_1	.0031225	.00306	.003010	.0030625	.003080
P_2	.003020	.003095	.003135	.003075	.003065
P_3	.002985	.003045	.0030075	.0030050	.003010
P_4	.0030925	.003050	.0030575	.003040	.0030125
P_5	.003150	.0030575	.00312	.003115	.00312
P_6	.041775	.05870	.05495	.052175	.04970
P_7	.035675	.05725	.05735	.05750	.05780
P_8	.007340	.008465	.008565	.008650	.00863
P_9	.00832	.00840	.008410	.008421	.008425
P_{10}	.01062	.010715	.01070	.01045	.01040

All resistance values are in ohms.

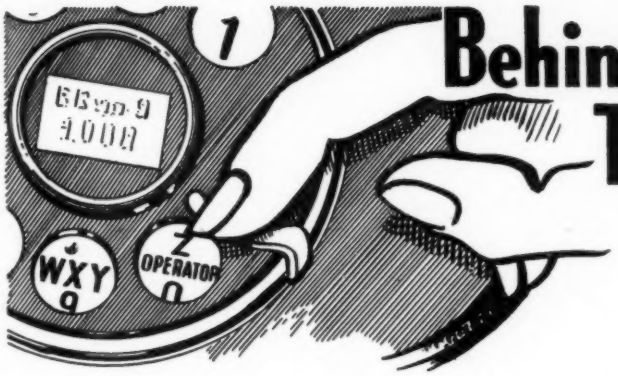
Average resistance of sleeve splice excluding specimen J.....0.0033214 ohm

Average resistance of twisted wire splice.....0.09612625 ohm

Resistance of sleeve and twisted wire splices as measured under different tensions.



This chart gives the comparative resistance of sleeve and twisted joint splices at 75 lbs. tension. Tests were made at room temperature (22 degrees C.).



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used to get accurate results to the seventh place beyond the decimal. While the data taken were of this type the general results of the test have been based upon the reduction of these values to those of three places. The problem of temperature correction for such low values of resistance was solved by maintaining a constant room temperature for all tests.

Each specimen was labeled and tests were made with tensions of 0, 25, 50, 75, and 100 pounds applied to the splices. This seemed advisable in order to determine the resistance at various typical stringing tensions. The specimens P_1 to P_{10} were both sleeve and twisted wire splices which were removed from service for some reason other than failure. They were included in the test in order to determine the effect of natural ageing of the splice under operating conditions. The sleeve splices of this series were in service one year while the twisted wire splices of the same series were in service for a period greater than a year.

The table of data indicates the nature of each splice and shows the resistance of the splice under tension. The data were used to construct bar graphs which show the resistance of the sleeve splices compared to the resistance of the twisted wire splices.

Sample J represents the extreme, a sleeve splice made on unscraped, rusty wire. It indicates that some cleaning is necessary before applying the sleeve. However, careful cleaning, as for sample A, does not warrant the time spent.

The average resistance of the sleeve splices was determined to be approximately 3.5 per cent that of the average resistance of the twisted wire splices under observation. The application of tension does not produce a uniform change in resistance of the splice.

The Operators' Corner

By MAYME WORKMAN

Traffic Supervisor, The Illinois Telephone Association, Springfield, Ill.

THIS IS the convention season—bringing opportunities to learn more about our business and to renew our enthusiasm. Series No. 405

THE SPRING of the year, when nature blossoms forth in bright, gay color, is an ideal time for conventions where new ideas are presented and modern, improved equipment is displayed.

As the young maiden heralds the approach of spring with new colorful garments to wear in the Easter parade, so progressive telephone men and women welcome the advent of the convention season.

Just as the warm spring rains help all nature to burst forth in resplendent color and beauty, so fresh seeds of knowledge and inspiration sown in convention conferences are later reflected in the quality of the service rendered to telephone customers.

Operators at the switchboard have a new note of interest in their voices; cashiers display a more friendly attitude; plant men perform their work with greater efficiency, and managers are more alert. The seeds of knowledge and inspiration sown in convention conferences are bringing forth good fruit.

As telephone problems multiply from year to year, convention conferences become more and more valuable—in fact they are indispensable. Thinking men and women recognize that a thorough knowledge of their job is essential if they wish to remain in the picture and to make progress.

The writer can remember when it required a certain amount of urging to encourage employes to attend conferences. Not so today. We like to believe this is due partly to the improvement in the quality of our programs but, no doubt, it is due largely to the desire on the part of employes to do the best possible job. So, instead of hearing "Do I *have* to go to the convention?" we hear, "I hope I will be lucky enough to be selected to attend." Chief operators and operators express their willingness to appear on the program. No sacrifice is too great to enable them to be present for the conferences and incidental festivities.

Have you attended a convention lately? Progressive state associations are trying to make them "bigger and better" every year—and you can help by being there and participating.

Questions from Illinois Operators

1. If you receive a chargeable report on a call but don't complete it within an hour, does the report charge still apply?
2. Where and how is "CA" entry made on ticket?
3. When a party has his telephone discontinued and a subscriber calls in for the number, what would be the proper phrase for telling him the telephone has been discontinued?
4. If a party reports WH from a number other than the one on the face of the ticket, do you enter "WH (other number)" and time on back of ticket or just "WH time?"
5. How many times do you ring a subscriber before you say, "I will ring them again"?

The answers to these traffic questions are given on page 48.

▼ ▼

General Telephone Corp. Outlook Declared Good

General outlook of General Telephone Corp. is "very encouraging," declared John Winn, president, at the annual meeting of stockholders on April 17. If general business continues at its present level or improves, earnings of the company should match or top 1939, he stated.

First quarter estimates are not yet available, although station gains were slightly better than seasonal and toll business ran 8 per cent to 9 per cent above last year in March. There are no rate cases which should seriously affect revenues, Mr. Winn said.

Questioned as to foreign holdings of the company's stock, officials said that less than 4,000 shares are held in England and about 8,000 in Canada.

▼ ▼

Station Gains of I. T. & T. Corp. in Nine Foreign Countries

International Telephone & Telegraph Corp. operating subsidiaries in nine foreign countries added 17,185 telephones in the first quarter of 1940, compared with a net gain of 17,168 a year ago, 16,500 in the 1938 period and 12,800 in the 1937 period.

On March 31, last, the companies were operating 854,568 telephones, of which some 670,000 are in Latin American countries.

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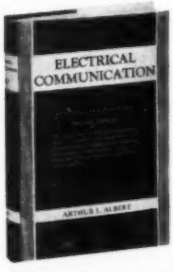

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Second Edition (January, 1940)

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Professor of Communication Engineering, Oregon State College

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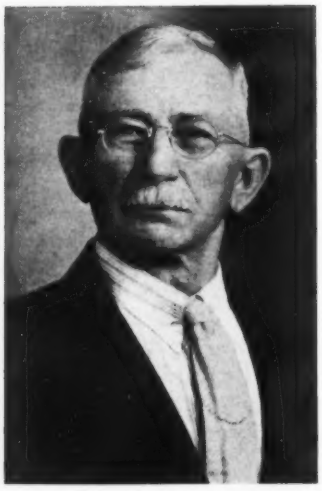
GRATEFUL FOR amendment to the Wage-Hour Law and realizing other problems must also be solved through united effort, Independents of the Hawkeye state hear

Many Phases of Their Business Discussed at Iowa Convention



PHIL ZERWAS, of Manning, reelected president of the Iowa Independent Telephone Association, in his annual address stated that the importance of association work had been so clearly demonstrated (with particular reference to the wage-hour amendment) that every company should now realize the value of united effort.

PRACTICAL MATTERS relating to everyday telephone work in its many phases were discussed at the 45th annual convention of the Iowa Independent Telephone Association, held at Hotel Fort Des Moines, Des Moines, April 16, 17 and 18. The convention had the largest attendance of any for many years and the entire group showed unceasing interest in all proceedings of the three-day meeting.

The attendance at the sessions on Wednesday, April 17, taxed the capacity of both the men's and women's meeting rooms. With this great interest in the association and its meetings it may be necessary to find larger meeting rooms for next year. More than 400 people enjoyed the banquet and floor show on Wednesday evening, April 17.

At the morning session on April 17 the following directors were reelected for three-year terms: Phil Zerwas, Manning Telephone Co., Manning; D. Mong, Iowa State Telephone Co., Newton; C. A. Farrington, Appanoose County Telephone Co., Centerville; Wilber Naylor, Western Light & Telephone Co., Kansas City, Kans. J. P. Walters, vice-president, Central Iowa Telephone Co., Toledo, was elected in place of S. C. Dows of Cedar Rapids.

Following adjournment of the convention at noon April 18 the directors organized by reelecting all officers as follows: President, Phil Zerwas, Manning; vice-president, R. A. Phillips, Sioux City; vice-president, George E. Atkinson, Creston, and secretary and treasurer, Chas. C. Deering, Des Moines.

The executive committee consists of President Zerwas, and Earle Bellamy, C. A. Farrington, A. J. Adams and G. E. Atkinson, all of the board of directors.

The resolutions committee, in addition to routine resolutions, expressed appreciation for the splendid work of the national association's wage and hour committee. One resolution extended thanks to all the Iowa Senators and Representatives for their support of the Wage-Hour amendment, especially to Senator Herring and Congressman Harrington.

Another resolution endorsed the work of the national association's toll compensation committee, mentioning especially Chairman Edwin M. Blakeslee. This resolution urged the prompt and vigorous prosecution of the campaign for a fairer division of toll revenues between the Bell and Independent companies.

Secretary Reports on Past Year's Activities

At the opening session on April 16 Secretary Chas. C. Deering reported on the association's activities for the past year. He related that a great deal of his time during the first seven months of 1939 was spent

CHAS. C. DEERING, secretary and treasurer of the Iowa association, was reelected to office during the convention last week. In his annual report Mr. Deering urged Independent companies to prominently display their bronze plaques indicating membership in the national association.

in Washington working with the national association's wage and hour committee.

He called attention to the fact that the Independent telephone industry united in this effort to secure an amendment to the Wage-Hour Law and that without united and thoroughly organized effort, the desired result could not have been accomplished. No association work in recent years has so thoroughly demonstrated the desirability of and the need for strong state associations and a strong national association, declared Mr. Deering.

"As usual," said Mr. Deering, "the association's office has been called on to answer questions on a wide variety of subjects. Franchises are expiring and inquirers ask for information about renewal procedures. Many have inquired whether the Iowa 'Use Tax' applies to telephone companies. The answer is that ma-

terials that go into telephone plant, which is from time to time used in interstate commerce, are not subject to this tax.

"Many inquiries are made about REA problems. The status of the telephone companies and their rights as against REA lines, has not changed during the past year."

The secretary recommended that all telephone companies display in their offices the map of the United States distributed by the United States Independent Telephone Association which has on it a black dot for every Independent telephone exchange.

"Many people do not realize the magnitude and strength of our industry," said Mr. Deering. "This is one way of bringing it to their attention. Display this map and the bronze plaque showing membership in the United States Independent Telephone Association."

The secretary said that at several of the state conventions held this year, a prominent subject has been that of rural telephone service, methods of improving it and regaining the farm stations which were lost during the depression. He urged all in attendance at the convention to pay close attention to the report of the Iowa association's rate and research committee.

He reported that the association's financial affairs are in satisfactory condition.

President and Other Speakers Address Convention

President Phil Zerwas of Manning then addressed the convention, saying the importance of association work had been so clearly demonstrated during the last year that it should be plain to every telephone company that it should become a member of the Iowa Independent Telephone Association.

He stressed the telephone companies' obligations to the public served, urged that these obligations be fully and cheerfully met, and urged the companies to see to it that they received a fair reward for services rendered.

At the conclusion of his address, the president appointed the following as members of the nominating committee: Major C. B. De Witt, Lime Springs; C. H. Molby, Creston, and L. F. Morrison, Grinnell.

He also appointed the following as members of the resolutions committee: L. D. Meyers, Logan; Earl Armstrong, Wilton Junction, and Joe L. Slaughter, Grimes.

W. H. Daubendiek of West Bend then showed some moving pictures which he took on his European trip last summer.

H. D. Sheldon of the Northwestern Bell Telephone Co., Des Moines, presented the motion picture, "A New Voice for Mr. X," at the opening session on April 17. This was well received and many of those present expressed a desire to have it shown in their local communities.

Edward F. Flynn of the legal department of the Great Northern Railway, St. Paul, made a splendid address on "Shores of Opportunities." Mr. Flynn was a rapid-fire speaker with a splendid message of optimism regarding the future of the United States.

Louis Pitcher, executive vice-president of the United States Independent Telephone Association, addressed the convention April 17 on "National Association Activities." He outlined the association's principal activities of the last year, spoke in the highest terms of the toll compensation committee's report at the national convention last October and praised Chairman E. M. Blakeslee for the painstaking work he had done.

Mr. Pitcher said that the association's important present activity was that of presenting to the Bell companies the need of the Independent companies for a fairer division of toll revenues.

"The Independent companies deserve a more equitable share of money paid for toll calls which they handle through their exchanges," Mr. Pitcher declared.

He said widespread dissatisfaction on the rate of division of toll profits has been expressed by members of the national association.

Paul Blakemore of the Coolidge Advertising Co., Des Moines, then made an interesting and appealing talk on the subject, "What About Public Relations?" The address was splendidly received.

B. C. Burden, transmission engineer of the Lincoln (Neb.) Telephone & Telegraph Co., addressed the convention on the subject, "Protection Against Lightning and Power Circuit Hazards." With this he presented a fine demonstration. The importance of his subject is increasing with the rapid construction of rural electric lines, especially those promoted by the Rural Electrification Administration.

L. D. Densmore of the Central Electric & Telephone Co., Sioux City, then made the report of the

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rate and research committee on recent Iowa studies. This committee was appointed last fall to gather information on exchange rates in Iowa.

Study Made of Exchange Rates in Iowa

It made a careful analysis of the information received, which showed a wide range of charges for exchange service with convincing evidence that a part of this service is certainly being furnished at less than cost. The result of the studies was in part shown by a large number of charts. The committee also presented a chart showing the telephone companies' tax dollar.

Mr. Densmore said that with the tremendous increase in taxes, with labor costs mounting due in part to the Wage-Hour Law, and with material costs rising, it is clearly evident that many rate adjustments must be made in Iowa if the telephone companies are to continue to furnish service.

The open forum on Thursday, April 18, was led by L. F. Morrison, of Grinnell. The open forum session at Iowa conventions has long been looked upon as a most interesting and instructive session, offering opportunity for questions and answers and consideration of the widest variety of subjects.

A large number of questions were asked about the Wage-Hour Law and its application, and many of those present participated in the discussion and told how they would handle the situation in their home exchanges. Inductive interference came in for some discussion and questions were asked on many other subjects.

At the conclusion of this session, a technicolor picture, "Handling and Processing of Western Red Cedar Poles," was shown by the Naugle Pole & Tie Corp., Minneapolis, Minn.

At each of the three principal convention sessions cash attendance prizes were awarded to persons in either the convention hall or the traffic conference. The prize winners at the morning session on April 17 were Ned Murray of Massena, Rena Belle Miller of Clarinda, and Evelyn Croghan of Griswold. At the afternoon session on April 17 the winners were Edith Lloyd of Remsen, Leslie M. Epperly of Leon, and George Heims of Monona. Winners at the morning session on April 18 were Elsie Mayberry of West Bend, Mrs. Edith De Witt of Lime Springs, and R. D. Minehart of Central City.

R. A. PHILLIPS, Sioux City, vice-president and general manager of the Central Electric & Telephone Co., was re-elected vice-president of the Iowa association. Mr. Phillips is also a director of the national association and a member of its special wage and hour committee.

The traffic conferences held during the Iowa convention were especially well-attended and interesting, and a complete report will appear in next week's issue. Lack of space prevented the traffic report being published in this issue.

▼ ▼

Durham (N. C.) Company Schedules Improvement Project

The Durham (N. C.) Telephone Co. on March 17 let contracts in the amount of $125,000 for the construction of a modern telephone exchange, according to announcement made by T. D. Wright, chairman of the board of directors. Work started on the project on April 1, and it has been estimated that it will take from nine to 10 months to complete the entire job, including installation of equipment.

Mr. Wright estimated that the present facilities are handling 43,800,000 local calls and 300,000 long distance calls annually. In 1932 there were 5,300 telephones in use in Durham, and now there are approximately 10,000. This increase has created a definite need for an expansion program.

"I believe," said Mr. Wright, "that Durham's growth in the past few years is a healthy and permanent one and indicates that it is to become one of the South's largest cities. Therefore, in the interests of subscribers, the company deems it necessary to enlarge its system along the plan adopted. . . ."

PERHAPS IT WAS the rain or the tone of voice used by the grunt who thought his department was most important, but at any rate Old Charlie answered with a line of talk which proved that

The Telephone Business

Isn't A One-Man Show

By WM. C. KENDRICK

LATE ONE rainy afternoon, when we were sitting around the stove in the storeroom, one of the young fellows, not long in the business, was trying to show off his importance by "allowing" that if it "wasn't for the construction department the telephone business wouldn't amount to very much anyhow."

Old Charlie, being used to such youthful braggadocio, puffed his pipe and rocked back and forth in an old chair that was once the general manager's. But finally his patience expired and he cut in with, "Wait a minute there, lad, wait a minute! You're not the whole show, not by a long shot. You've forgotten the operators and the folks in the front office; if they forgot to collect the bills, who'd put the money in your pay envelope?"

As no one answered this query, he followed up his advantage with a line of talk that he had been itching to give to some of the grunts for a long time, by saying: "Of course, we plant fellows are important, but so is everybody else in our business, from the bosses on the top floor of our headquarters building, to the last grunt in the gang; each has his own part to play, and unless he plays it well he is sure to get the gate some Saturday night."

"Oh, them brass hats, they make me tired," cut in the new grunt. "I seen one of them with a derby on, and spats, the other Sunday when I was shooting trouble at the hospital. What do they do to be so important?"

Old Charlie was puffing fast now and spitting in the stove box, for he had brought up a lot of the bosses and taught them their first lessons in plant work, and he wasn't going to have mud thrown at them by a cub. Finally he said:

"I'd like to know how long we'd have any work to do if it wasn't for the bosses. Who do you fellows reckon carried us through the depression, when others were being laid off right and left? Who figured it out to make our work safer, and to give us better tools and trucks and the like of them? You don't want to forget that we can now do our work a lot easier than formerly.

We have better transportation than we ever had since I've been in the business, and that's a long time, as you all know—it sure is—and if you don't believe it just look up my service record at the superintendent's office.

The brass hats and their boys set up all these improvements for us, and they look out to make our work safe for us, and see that the money is in the pay envelope on time for us to buy the groceries. No use asking you a fool question, you know it's the bosses, big and little, who keep their minds on us, on our work, and on the public, all the time."

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"How about when they are fishing?" put in one of the gang. "A heap of them fellows put in a lot of time running around."

"Even when they go fishing," Charlie replied, "yes, even when they go fishing. A fellow can think up a lot of good ideas while he's holding a fishing line. I've thought of some good ones myself, so I know what I'm talking about.

"Ever since I've been in this business, I've been for the bosses. In fact, each of us is something of a boss himself. We plan much of our work, and look out for expenses and talk about safety, and are careful with our trucks and material and when we do these things we are helping to manage this business.

If we do these things well, we will be given management work, and then we'll be the bosses and we'll hire some new guys to do what we are doing now. Didn't you know that most of the bosses came up from the ranks? I saw a writeup the other day that stated a number of presidents of Bell System companies had started at the bottom just like we did."

"Oh, baloney," said another youngster. "All them fellows is capitalists and I'm agin 'em. They've got more money than we'll ever get."

"Maybe so," said Charlie, "but I'm a capitalist myself. I own some stock in a corporation that I bought with the overtime I made on that big freeze three winters ago. And, boys, it sure is a swell feeling to know that I'm going to get those dividends when they are due—they've never failed yet!

Careful Investment of Money Is Wise Thing to Do

"Boys, if I was you, I wouldn't bellyache about the capitalists. I'd be one myself. Fact is, most of you are but don't know it. If you have a bank account, or own a life insurance policy, you are a little capitalist, and it takes a lot of capital to build exchanges, to buy cable and to build pole lines. Where would it come from but from the dear public —school teachers, dentists, store clerks, brick-layers, and little old ladies dressed in black—they need the dividends for groceries, too, just like I do. And the big thing is, boys, when we need more money to keep the plant growing, believe me, the public will reach down and dig it up—if—if we do our part to take care of what they put up!

The public — they are the ones who make the wheels go round! They put the money in our pay envelopes, and they are our real bosses after all. That's the reason the bosses are always talking about public relations, and service from the customer's viewpoint, and such as that! I thought that was just a lot of baloney when I first heard about it. Some commercial guy gave us a talk about it when the depression came along, but now I know it's the goods!

What's more, the public not only puts up the money to run our business but it buys our service, and, through them fellows at the legislature, it regulates our business—and don't you ever forget it!

So it looks like Mr. Public plays a big part in our show. If the service is poor, he will not buy it; if our business is badly run, he will not finance it, and if he doesn't like us he will make it hot for us through that public service commission I heard the bosses talking about the other day!"

The gang began to look at the clock and to button up their lumber jackets, and Charlie saw that he had said enough: "Well, lads, it's about time for me to sign off this broadcast, 'cause the wife will be hopping me for coming home late, and it's her biscuits I'm thinking about now. I'll admit that we are pretty smart guys, but it takes men and women, stockholders and customers to make this business go, fellows—if any one fails, the old business will bog down and we'll all be in a mess!"

Answers to Cable Construction Questions on Page 32

1. The use of a strand dynamometer has been found to be very satisfactory.

2. The usual tool used is a wooden stick known as a "dressing tool" or cable straightener.

3. Assuming a condition where the temperature is 60° F., the proper tension for 6-M strand is 1,100 pounds, for 10-M strand 2,000 pounds and for 16-M strand 3,600 pounds.

4. The most satisfactory method of bowing correction is the introduction of slack into the suspension strand.

5. Bowing will be most pronounced at the time of highest temperatures which is also the time that corrective measures are most effective.

6. Repeated bowing results in continued bending of the cable. This in turn causes cuts and cracks in the cable sheath at points where movement of the cable is restricted.

Effects of Technological Advances on Bell System Employment

AN EXECUTIVE told the monopoly committee (Temporary National Economic Committee) on April 17 in Washington, D. C., that the Bell System retained 60,000 unneeded employes "at the bottom of the depression." W. H. Harrison, vice-president of the A. T. & T. Co., said retention of these extra employes explained why the "increase in the number of employes has not kept pace with the increase in telephones, usage and revenues" in recent years.

"Looking ahead, as we see the situation, there is a large potential market for more and more telephone service and we are exerting our energies to develop this market," he told the committee. "We are counting on continued advance in technology to help in this and I am confident that employment opportunities, as well as the need for new capital goods for plant additions, will be increased. Our current gains point specifically to this."

Mr. Harrison testified: "We have used up reasonably well our excess plant capacity." He added that the company will have to get back to a more normal construction program in order to meet the increasing demand for telephone service.

He told the committee that the A. T. & T. realizes it has "a responsibility to the people put on the payroll" and that during the depression the company did everything it could to prevent lay-offs of employes. From the beginning, he asserted, it has been the policy of the company to introduce improved practices and improved apparatus "in such a way as to avoid or minimize adverse effects in the nature of economic waste or hardship."

He said that "everything possible, including long-term planning and, generally, separation allowances, is done to minimize the consequences" of change-overs from manual to dial switchboards. During the depression, he said, "thousands of employes were retained by spreading the available work and other thousands by introducing productive 'made' work." Introduction of the new dial offices was reduced to a minimum during this period, he stated.

Charts submitted by Mr. Harrison showed that the number of telephones in service, the company's revenues and the plant investment all have recovered from the depression lows and moved on to new peaks, while employment and payrolls still are below the pre-depression high.

Questioned about the failure of employment and payrolls to regain lost ground, Mr. Harrison explained that during 1928 and 1929 the company was spending about $600,000,000 a year for construction, as compared with only $360,000,000 at the present time. As a result, he said, excess capacity was developed. Also, he pointed out that the policy of spreading work and making work in order to avoid lay-offs made it possible for the increased demands for service, which started in 1933, to be met without a material increase in employment.

He reported also that the proportion of the revenue dollar available for payrolls has remained fairly steady, while the earnings available for investors, in comparison to revenue, have gone down.

The A. T. & T. vice-president told the monopoly committee that the dial system had not ended the jobs of all operators, as many still were required for the handling of changes, toll and long distance calls and information requests. The system also required additional men of greater skill and higher wage standards than under the manual system, he stated.

The depression was one of the main reasons why telephone companies' employment had not expanded in recent years, Mr. Harrison said. One result of it, he said, was to reduce the number of telephones and, therefore, the number of persons needed to service them. Another was that it created considerable excess plant capacity, which made unnecessary an annual plant construction program comparable to that in the last few pre-depression years.

From several of Mr. Harrison's contentions Miss Rose S. Sullivan of the Commercial Telegraphers Union took dissent. Presenting labor's side of the story, she contended that it was entirely practicable to handle the present volume of telephone service or any enlargement of it with a manually-operated system, and to give far better service than did the dial system.

She estimated that introduction of dials on about 9,000,000 of the 17,000,000 telephones in the Bell System had abolished 150,000 operator jobs in the last 15 years.

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1. *Install the guard clamps*

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Ask About A Trial Order

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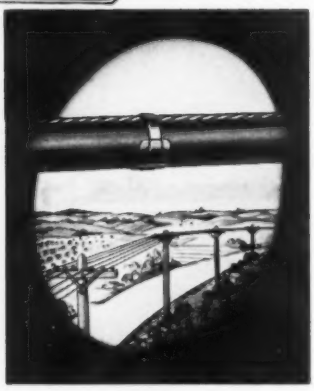

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Mr. Harrison had told the committee that "conjecture" as to the number of operators which would be required on manual switchboards today to handle the number of telephones in service "is futile." The present "quality and price" of the telephone service today, he said, "would be impossible under all-manual operation."

Development of unionism among operators, besides the NRA and the National Labor Relations Act, Miss Sullivan asserted, had much to do with the adoption of dialing.

Declaring that Mr. Harrison's picture of wage increases did not tell the whole story, she stated:

"Wages have gone up somewhat largely because no new employes, who naturally get the lowest rates, have been taken on for years."

Bell 1940 Construction May Cost $135,000,000

The American Telephone & Telegraph Co. has started on its most ambitious construction program since 1931, with present plans calling for an outlay of $135,000,000 this year, Walter S. Gifford, president, disclosed at the annual stockholders' meeting on April 17. In 1939 the company spent $101,400,000 for additions to plant.

Mr. Gifford explained that the management does not expect to undertake any new financing in connection with the 1940 construction program.

He told stockholders that the Bell System is preparing for a greater increase in telephone service this year than in 1939, which was the fourth best year on record insofar as the expansion of service is concerned.

TACKLE THE JOB

By ANNE BARNES

Traveling Chief Operator, Iowa Independent Telephone Association, Des Moines, Iowa

THE OTHER morning when I finally forced myself to do a piece of work that I had put off and put off because it wasn't an easy or interesting task, I couldn't help thinking, "Well, it wasn't so difficult after I tackled it." I cannot say I was as much interested in doing it as in seeing it through to the finish—and in doing it right so that I could go on to something I liked. You can put yourself into the things you like to do, and you can feel a pride in accomplishment.

Sometimes we defer tackling a task in the fear that we cannot do it well or right. Our fear magnifies the task until it appears more and more difficult to do.

One illustration comes to my mind. I asked a chief operator of an exchange, where we were going to conduct a district meeting, if she would write and read a paper on a certain subject.

"Oh, let someone else do it. I know how to handle my duties in respect to that subject but getting it on paper, that's different; and reading it to a lot of people—that's tragic to think of doing."

I pointed out to her that it would be a real feather in her traffic hat to handle this particular subject as it had to do with a new type of switchboard her company had recently installed—the first of its kind in Iowa; that operators and traffic men would come from distant points to see and hear something about its operation.

"I'll tackle the job of preparing the paper but I don't think I could ever stand before a lot of people and read it."

"Well, tackle it," I told her. "Lick it as you go along even if you have not entirely overcome your fear when you start reading. Make up your mind to see it through to the finish. Either lick it or allow it to lick you."

When Mary Jones came forward that day in the conference she appeared to be paralyzed with fear. Her hands shook so that she could scarcely hold her paper. Her voice quavered, broke like an aged person's, then she stopped reading and, without looking up, gripped the paper tightly in both hands for an agonized minute. Then she spoke to the paper: "What's the matter with you, paper? You are shaking like a leaf. Are you afraid?"

The tension was broken for everybody who was suffering along with her, and everyone laughed heartily including herself. Mary went on reading her paper to the finish. *She conquered her fear.*

MORAL: "The gods give thread for a web begun."

Commission and Court Activities

Bay State Toll Rates May Be Studied

The Massachusetts Department of Public Utilities is considering a possible investigation of intrastate toll charges on the New England Telephone & Telegraph Co.'s system within the state, as a result of a discussion in a recent hearing on the use of mileage charges for so-called foreign exchange service.

At the hearing William McLaughlin, general commercial engineer for the company, pointed out that the foreign exchange service is a substitute for toll service. It is designed for subscribers who desire to make many calls to a distant office, to which they may be directly connected without toll charges. The present rate is $1.20 per quarter-mile from the exchange center.

About 900 of the company's 650,000 subscribers in Massachusetts use foreign exchange mileage service, notably in communities outside such cities as Lowell, Lawrence and Woburn. The hearing was adjourned to May 1.

▼ ▼

Temporary Injunction Halts Oklahoma Rate Reductions

A three-judge federal court, sitting at Oklahoma City, April 19, granted a temporary injunction restraining the Oklahoma Corporation Commission from enforcing the provisions of its order of February 21, which reduced rates in 33 cities where exchanges are operated by the Southwestern Bell Telephone Co.

The part of the commission order, which denied rate increases in 21 towns, was allowed to stand temporarily and the provision which granted increases in seven towns was permitted to stand. The federal court order, while granting the company a measure of temporary relief, denied its application for authority to put in immediate effect temporary rate increases in 21 towns. It did not annul other provisions of the commission order which the company contended are unconstitutional and confiscatory.

The federal court order is effective only until the Oklahoma Supreme Court, which now has under consideration the commission order of February 21, passes finally upon the appeal taken by the company. Bell officials and attorneys, in bringing the action in the federal court, contended that something should be done immediately to stop alleged confiscation of its property in many state exchanges, which they claim is permitted under the commission order.

The temporary injunction granted by the federal court requires the Southwestern Bell to guarantee refunds to its subscribers in towns where temporary rate increases are permitted under the court order, in case the Oklahoma Supreme Court should direct lower rates than authorized in the federal court ruling.

▼ ▼

Hearings Resumed on Bell Rates in Washington

The Washington Department of Public Service on April 16 resumed hearings in Seattle on its investigation of the rate structure of the Pacific Telephone & Telegraph Co. and the rate changes proposed by the company for its exchanges in Washington. Testimony heard during the week dealt chiefly with reproduction cost estimates, depreciation reserves and return on investment.

A motion that the state department rule immediately on protests against the rate changes proposed in the Seattle area was taken under advisement by Don G. Abel, department director, as the hearings were resumed April 16. Deadline for the department's ruling on the proposed rates is August 15.

Raymond D. Ogden, attorney for the Seattle Telephone Users' League, made the motion and requested that the department dismiss proposed changes and proposed mandatory metered service. Prosecutor B. Gray Warner, representing King county; Assistant Corporation Counsel Glen E. Wilson, representing Seattle, and Attorney Harry Henke, Jr., representing the Telephone Users League of Washington, joined Mr. Ogden in the motion.

Mr. Ogden charged that under changes proposed by the company, use of telephones by Seattle subscribers would be "confined virtually to business and single-party lines, making the telephone a luxury" available only to a minority. The attorney also attacked the company's plan to have the city "cut up arbitrarily into rate zones."

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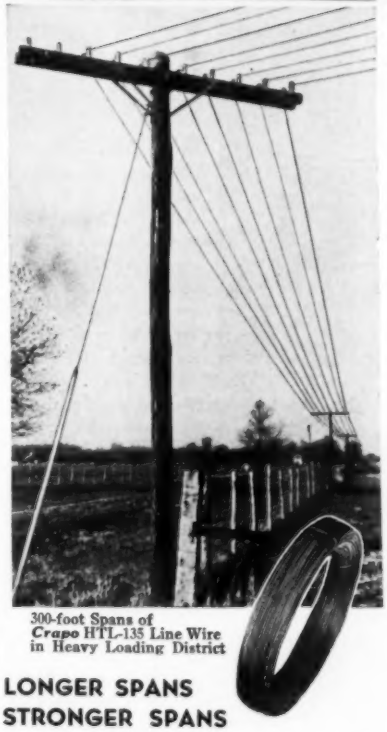

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Crapo HTL-85 permits spans of 225 feet in heavy loading to 375 feet in light loading districts. *Crapo* HTL-135 makes possible spans of 350 feet in heavy loading to 500 feet in light loading districts.

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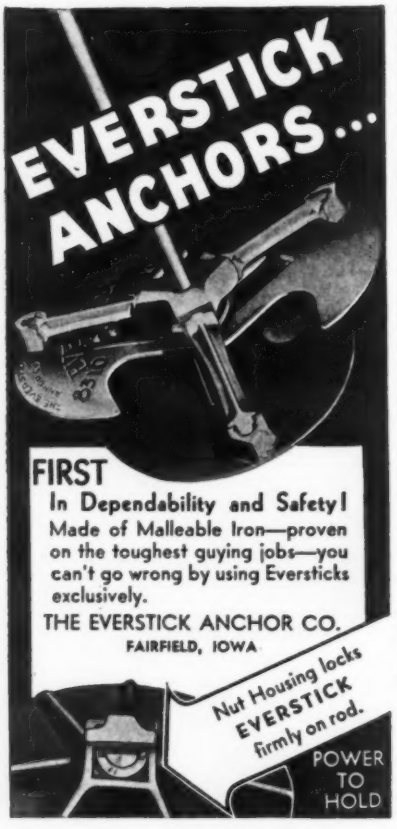
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POWER TO HOLD

Otto B. Rupp, chief counsel for the Pacific Bell, announced April 16 that the company had completed its case, after brief testimony by F. D. Tellwright, company chief engineer.

Through Mr. Tellwright, Attorney Rupp introduced an exhibit showing errors previously discovered in the company's estimate on reproducing its plant in Washington, had a "net effect" totaling $285,315. Mr. Tellwright said the revised cost of reproduction was estimated at $69,401,810 as of December 31, 1938.

H. G. Lenahan and H. G. Weiler, state engineers, testified that the company's property inventory is essentially correct. They said errors found ranged from one-tenth of 1 per cent to 1 per cent.

A. J. Greer, chief accountant for the state department, testified April 17 that the Pacific Bell's profit in 1939 was $1,806,756 instead of the $1,248,360 previously listed by company officials.

Under questioning of Carl I. Wheat, department counsel, Mr. Greer reported that exchanges in the state earned 4.97 per cent last year on the total investment, less a depreciation reserve of 25 million dollars. The company will make 5.68 per cent under present rates this year, he estimated, and would make 9.26 per cent under its proposed rates.

Walter J. Herrman, Los Angeles, Calif., investment banker, presented a study of capital costs in which he advised that the Pacific Bell should earn 5.57 per cent on its capital investment. This compares with 7.25 per cent figured by Ben Ehrlichman, Seattle investment banker, who testified for the company.

Lewis T. Hayner, department engineer, on April 18 testified that he computed depreciation of equipment in the company's exchanges at Seattle, Tacoma, Spokane, Aberdeen and Bellingham at 85 per cent of original book value. He said company witnesses previously testified the company should have a depreciation reserve of 76 per cent of the equipment. Mr. Haymer also said the company has in use in Washington "a great amount" of "obsolcte" and "inadequate" equipment, through which it incurs losses.

He estimated total depreciation in company equipment at $2,272,000, as compared with the company estimate of $190,000 as of December 31, 1938.

Summary of Commission Rulings and Hearings

Federal Communications Commission

April 12: American Telephone & Telegraph Co. requested issuance of an order either dismissing petition for want of jurisdiction or, in the alternative, authorizing acquisition of assets in connection with the proposed dissolution of American Telephone & Telegraph Co. of Massachusetts.

April 12: Indiana Bell Telephone Co. requested authority to supplement existing facilities by constructing four

ANSWERS TO TRAFFIC QUESTIONS ON PAGE 38

1. If the chargeable report is received within one hour from the filing time and the call is canceled, it will be subject to a report charge. A report charge and a message charge never apply on the same call.
2. "CA" is entered in the upper right-hand corner on the face of the ticket, followed by the time the call was canceled. If the call is canceled within the hour in which it was filed, it is not necessary to include the hour as well as the minutes. In this case your entry would be, for example "ca 02".
3. If this report is given by the local operator, she will say, for example, "123 has been disconnected." If the Information operator passes the report to the calling party, she will use one of the following phrases, for example:
   (a) "I'm sorry, that telephone has been disconnected."
   (b) "John Doe's telephone has been disconnected."
   (c) "The telephone for a florist at 123 Main Street has been disconnected."
   (d) "That telephone has been disconnected."
4. The entry "WH at (No.) (time)" is entered on the ticket.
5. Connections on which voluntary supervision is given, after ringing three times at 10-second intervals or at the end of 30 seconds, if the called station has not answered, say, "I will ring them again," or, "I am trying to get them."

additional wires between Evansville, Ind. and the Kentucky-Indiana state line.

April 12: Mountain States Telephone & Telegraph Co. requested authority to supplement existing facilities between Tucson and Globe, Ariz.

April 12: Southern Bell Telephone & Telegraph Co. requested authority to supplement facilities between Atlanta and Carrollton, Ga.

April 13: J. J. Becker authorized to hold the position of vice-president of Citizens Telephone Co. in addition to the positions of vice-president and director of the Cincinnati & Suburban Bell Telephone Co. and director of Citizens Telephone Co.

April 15: Tariff schedules, containing reductions in interstate toll rates which are expected to reduce the cost of long distance conversations to the public by about $5,300,000 a year, filed by the American Telephone & Telegraph Co.

The new rates, worked out in conferences between the company and the commission without the necessity of legal proceedings, are to become effective May 1.

April 15: Pacific Telephone & Telegraph Co. authorized to construct a coastal harbor station near Fort Stevens, Ore., to operate in the public service, using the frequency 2,598 kilocycles with a maximum power of 400 watts, unlimited time, with A2 and A3 emission, and a coastal harbor station near Portland, Ore., to operate in the public service, using the frequency 2,598 kilocycles with a maximum power of 50 watts, unlimited time, with A2 and A3 emission.

April 16: American Telephone & Telegraph Co. and Ohio Bell Telephone Co. requested authority to supplement existing facilities between Cambridge and Columbus, Ohio.

Kansas Corporation Commission

April 29: Hearing on application of Hazelton Telephone Co. (Howard B. Hoffman) for a certificate of convenience and authority to transact the business of a public utility in Hazelton.

May 6: Hearing on application of Central Kansas Telephone Co., Inc., for authority to make certain changes in rates at Waverly.

May 7: Hearing on application of Central Kansas Telephone Co., Inc., for authority to make certain changes in rates for service at LeRoy.

May 13: Hearing on application of Central Kansas Telephone Co., Inc., for authority to make certain changes in rates at Westphalia.

May 14: Hearing on application of Central Kansas Telephone Co., Inc., for authority to make certain changes in rates at Harris.

May 20: Hearing on application of Southwestern Bell Telephone Co. for permission to file and put into effect a new schedule of rates in Phillipsburg and vicinity.

May 21: Hearing on application of the Southwestern Bell Telephone Co. for permission to file rates for hotel private branch exchange service.

Kentucky Public Service Commission

April 5: The Sebree city council requested the commission to determine why subscribers of the Sebree exchange of the Southern Bell Telephone & Telegraph Co. are not permitted free service to other parts of the county. The council contends such service is granted to residents of Dixon, Providence, Clay, Wheatcroft, Blackford and Poole.

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You'll save time and money installing L-M Fibre Conduit . . . here's why. It's light in weight, easy to carry, easy to handle. It comes in standard 5 and 8-foot lengths, easily fitted into tight joints. Its strong walls prevent breakage delays. L-M Fibre Conduit lasts a lifetime, too . . . resists decay because it is chemically neutral to soil acids and alkalis.
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Massachusetts Department of Public Utilities

April 11: Hearing on application of New England Telephone & Telegraph Co. for authority to increase rates between Lawrence and Andover.

Ohio Public Utilities Commission

April 15: The commission approved new boundaries for the Miamisburg exchange of the Ohio Bell Telephone Co. and the Germantown exchange of the Germantown Independent Telephone Co., resulting from the transfer of a small territory of the latter company to the former.

April 16: Applications filed by Weston Home Telephone Co. for authority to sell all of its property and business for $86,514.20 to the Northern Ohio Telephone Co. and for authority by the latter company to purchase the property and to capitalize the same by issuing and selling at par $86,514.20 of 6 per cent preferred stock.

Virginia State Corporation Commission

April 2: Clifton Forge-Waynesboro Telephone Co. authorized to issue first mortgage bonds amounting to $250,000. A part of the issue will be used in refunding outstanding bonds of $195,000. Of the total issue, $100,000 will be at 3 per cent and $150,000 at 3½ per cent.

Wisconsin Public Service Commission

April 19: Boscobel Telephone Co. authorized to issue $15,000 of 4½ per cent promissory notes. The notes will mature at the rate of $1,000 a year.

Of the $15,000 about $3,300 will be used to acquire telephone property from Crawford County Telephone Co. and $11,700 for metallicizing lines to overcome interference and to make additions to the plant.

April 23: Hearing in Madison on complaint of city of Two Rivers regarding the rates charged by the Commonwealth Telephone Co.

The city council filed the complaint on April 12, 1939, and charged that the telephone users of the city were being charged "unjust and unreasonable rates by the Commonwealth company, resulting in an excessive return to said Commonwealth Telephone Co."

April 25: Hearing in Milwaukee on complaint of Mrs. B. Armstrong regarding rates of Wisconsin Telephone Co. in Greendale.

April 30: Hearing in Madison on application of the Canton Farmers Telephone Co. for authority to increase rates.

May 3: Hearing in Waukesha on application of Commonwealth Telephone Co. for authority to discontinue non-standard toll rate between Merton and Pewaukee.

May 7: Hearing in Madison on application of La Crosse Telephone Co. for approval of issuance of $740,000 principal amount of first-mortgage, sinking fund bonds.

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This is an excellent bell for solving the needs of the subscriber in the garage, lumber yard, print shop, machine shop, or such place, who needs an extra loud telephone signal.

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FAIR TOLL DIVISION

(Concluded from page 28)

division with the Independents. To avoid that, the Bell companies might easily—and with profit to themselves—volunteer more liberal treatment of their partners in the toll business.

One thing the FCC would be interested in studying—if it went into the toll division question—is why Independent companies in eastern states, as far west as Ohio, are treated so much more liberally than the Independent companies west of Ohio. In middle western states and western states, the Independents receive a much smaller percentage of the toll revenues than is allowed in Ohio and "all points East." In view of the fidelity of the Bell System to "standardization" and "uniformity" in most matters, this discrepancy is hard to understand, unless the nearer to Yankeeland the better the bargainers and traders.

▼ ▼

THE ART OF SOLDERING

(Concluded from page 21)

the high spots of the weave in the fabric and also helps to form the cloth.

The practice of rubbing a cloth with a hot ladle to break it in has ruined many a cloth before it was ever used. The fabric is charred through contact with the hot ladle and tears very easily after it is used to wipe a few joints. A cloth can be turned several times before it is discarded as unfit for use. If a cloth is ironed out after being unfolded, it will be as good as new when it is folded again.

The cable splicer is well repaid for the care he takes of his wiping cloths, for an old cloth well broken in always does a better job than a new one. Occasionally the thread with which a cloth is stitched will part or pull out. This stitch should always be replaced with cotton thread.

Never use wire as a temporary stitch as this may become tinned and pick up a small amount of solder that may cause a burn or cut on the hand while wiping. It may also cut a deep ridge into the joint when making the last wipe, as the joint is being finished.

The other tools mentioned do not require much attention with the exception of the ladle. It should not be abused by using it as a hammer to break up the mass of metal which has dropped into the pan. Using the ladle as a hammer may weaken the weld between the spoon and the handle, and finally result in these two parts breaking away from each other.

If the metal in the pan will not break up without pounding, a ladle full of hot metal poured over it will usually bring the metal to a high enough temperature so that it can be broken up by raising and shaking the paper or cardboard which has been placed in the pan to catch the solder.

▼ ▼

"HOW TO DO IT"

(Continued from page 27)

the soil should be banked firmly around the base of the pole. In towns and cities the hole should be filled and tamped level.

When special parts, such as "A" or "H" fixtures, are to be used, they are generally assembled on the ground before erection. This method is not only easier than assembly in the air, but a better and safer job is generally possible. When a push-brace is to be used, the main pole and the brace are generally fitted on the ground and set separately and then joined in the air at the point of contact.

After the poles are all set, corner and storm guys should be installed before starting to string the wire. An earth auger may be used to drill holes for patent anchors. There are various types of these anchors on the market and they may be used with complete success. When the anchor is set, the guy may be installed and pulled so that the proper rake is placed in all corner poles.

It is generally impossible to get corner guys tight before the strain of the wire is placed on them. Poles should be pulled slightly out of line toward the anchors to allow for their settling after the strain is placed on them. When a pole is storm-guyed in two or four directions, the guys may ordinarily be pulled tight.

If the line is to be transposed, the brackets should now be installed and the transposition poles suitably marked. Individual metal numerals and letters nailed to the poles are now generally used for this purpose. They prove more satisfactory than painting the letters on the poles which was formerly the accepted practice.

When the poles have all been set and corners guyed, the next and last phase of the job is to string the line wire. Various methods of wire

COMING CONVENTIONS

United States Independent Telephone Association, Spring Conference, Stevens Hotel, Chicago, May 1 and 2.

Indiana Telephone Association, Claypool Hotel, Indianapolis, May 8 and 9.

Pennsylvania Independent Telephone Association, Yorktowne Hotel, York, May 16, 17 and 18.

Wisconsin State Telephone Association, Park Hotel, Madison, May 22 and 23.

The Illinois Telephone Association, Hotel Pere Marquette, Peoria, May 28 and 29.

New York State Telephone Association, Hotel Syracuse, Syracuse, June 5 and 6.

North Dakota Telephone Association, Gardner Hotel, Fargo, June 12 and 13.

California Independent Telephone Association, Miramar Hotel, Santa Monica, June 19 and 20.

Oregon Independent Telephone Association and Washington Independent Telephone Association, Gorge Hotel, Hood River, Ore., Joint Meeting, June 28 and 29.

Michigan Independent Telephone Association, Hotel Olds, Lansing, July 24 and 25.

stringing may be used depending upon the type of equipment available. Ordinarily one full crossarm of wire should be strung in one operation.

When the line parallels a road, it is generally the best practice to mount all reels on a truck or trailer and string the wire from it. When the pole line runs through rough country, the reels may be placed on the ground and the wires pulled out along the lead. Running boards with snaps for attaching the wires should be used in order that wires may be kept straight and transpositions thrown in as they are strung.

After the wires have been laid out on the ground they must be placed on the crossarms before being pulled. On high poles, the wires must be carried up and placed on the crossarms by linemen, but on short poles they may be piked in place to save both time and labor.

The use of compression type sleeves for all wire splicing is strongly recommended. Not only is this method good mechanically and electrically, but the sleeves, being small, slide over the crossarms during pulling without catching.

All wires should be placed in loose ties on low poles where the grade changes in order that they will not raise out of reach on the pull. The length of the pull will depend upon the nature of the terrain over which the line runs. In level country, a pull is usually one-half mile or longer. Temporary guys should be placed on each pole where a pull is to be made. The wires should all be pulled level and to the proper tension.

Targets made of lath may be used advantageously for accurate sighting of the wire. When wire is pulled to proper tension, it should be snubbed with short lengths of rope and buffalo grips, on the temporary-guyed pole. After the pull has all been tied-in on the insulators, the temporary guys and snubs should be left in place until they are slacked off by the next pull made on the line. When tying-in wire linemen should first make sure that all insulators are tight on the pins before attaching the wire with the regulation ties. It generally proves more desirable to purchase ready-made tie wires for steel, Copperweld and copper wire as they cost little and make a much better job possible.

When the line wire pulls either up or down on an insulator, a special tie should be made to hold the extra strain. Before tying-in wires, a lineman should always make sure that they are in the clear in the span behind him and not crossed or bucked. The crossarms should also be pulled squarely at right angles to the line before the wire is tied in place.

Care should always be exercised during construction to make sure that wire is not nicked or burned even slightly, for each small defect will in all probability represent a case of trouble and a service interruption at a later date. To provide a long life for the line only the best materials and approved construction methods should be used.

It is not claimed that an aerial wire line must be built in exactly the sequence outlined here, but it is believed that some such system is necessary in order to utilize to best advantage all conditions necessary to make a successful and economical job possible. After all, it costs little more to build a good line in this manner and certainly big dividends are paid in long years of service with a minimum of maintenance and service interruptions.

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Telephone News Brevities

Construction

Nauvoo, Ill.—Forces of the Mississippi Valley Telephone Co. have been metallicizing lines in the rural districts to overcome interference caused by rural electrification lines now in use.

Cannelton, Ind.—The local Chamber of Commerce has been notified by officials of the Indiana Bell Telephone Co. that additional long distance service will be installed between Cannelton and Tell City. Work began April 1.

Walker, Minn.—The Walker Telephone Co. will install 10,000 feet of cable this summer to add to the 7,500 feet put in last year, according to a statement of Manager J. C. Steinhagen. Improvements will also be made at the central office, he said.

The new cable will provide excellent telephone service to the many new homes being built along the lake and highway to the village. All the power-line noises and interference common to the grounded circuit telephone lines, will be eliminated under the new system.

Since Mr. Steinhagen purchased the telephone exchange last summer many progressive steps have been taken and the service has been vastly improved.

Salem, Mo. — Installation of new telephone equipment here has been completed by the United Telephone Co. and the service has been cut over from the old magneto system.

The installation was made under the direction of W. F. Throckmorton of Clinton, equipment engineer of the company, and R. A. Moore, company manager here. There are at present 740 telephones served through this exchange. The new equipment consists of the latest type hand and wall sets.

Bellefontaine, Ohio — The United Telephone Co.'s newly remodeled and decorated commercial offices on the first floor of the telephone company building were opened for public inspection March 15 following a rapid "change-over" without changing the exterior appearance of the building.

A hall and small back room have been eliminated, giving the commercial office a more roomy appearance and doing away with a long counter. The east wall is built largely with glass brick and the woodwork is in natural finish. The office has been equipped with indirect lighting.

The commercial office is prepared to give 24-hour Postal Telegraph service.

Celina, Ohio—The Ohio Associated Telephone Co. is adding two circuits to Dayton for the purpose of facilitating the long distance service from here. By adding the Dayton circuits the company will decrease the number of circuits from here to Lima, from five to four.

Rock Creek, Ohio. — The Citizens Telephone Co. on April 13 completed the installation of automatic dial equipment in the local exchange building and the 205 subscribers now have dial telephones instead of the magneto equipment formerly provided.

William McCluskey, president and manager of the Citizens company, said that long distance calls would be handled through Ashtabula and Jefferson.

North Bend, Ore.—The West Coast Telephone Co. has announced through its local manager, F. H. MacGougan, that North Bend and Empire will be using automatic dial telephones before the end of 1940. The change to dial has already been made at Powers and Port Orford.

Cecil, Wis.—The Cecil-Green Valley Toll Line Co. is preparing to change from manual to automatic operation. W. H. Meyer, secretary of the company, has estimated that the system will be in operation by June 1.

The company has constructed a new fireproof building with a glass brick front. The entire system will be changed from wire to cable, and all subscribers will have the handset type telephones. It is estimated that the completed improvement will cost in the neighborhood of $15,000.

Miscellaneous

La Fayette, Ga.—Fire destroyed the local exchange building of the Walker County Telephone Co. in late February. Several other buildings in the business section were damaged and unofficial estimates put the damage at $50,000.

Chillicothe, Ill.—Al Hawley of Sullivan, Ill., has assumed the duties of manager of this district of the Illinois Central Telephone Co. as the result of changes made in the company personnel. He replaces A. G. Kruger, who takes up Mr. Hawley's former work in Sullivan, after a two-year period here.

The district manager has jurisdiction over eight telephone exchanges including Chillicothe, Henry, Princeville, Sparland, Abingdon, London Mills, Washington and Hopedale.

Indianapolis, Ind.—Engineers of the Indiana Bell Telephone Co. have placed amplifying systems to broadcast fire alarms in six local fire engine houses as an experiment. The system will enable the houses to receive telephone alarms relayed from the Gamewell division.

Warsaw, Ind.—The United Telephone Companies, Inc., with headquarters here, had a net of $193,479.03 last year, according to the annual report filed with the Indiana Public Service Commission. The company paid $104,085.80 in dividends on common stock out of income. Total income was $761,095.83. The number of telephones in operation at its exchanges in 78 northern Indiana towns increased from 25,426 to 26,220 during the year.

Creston, Iowa—A typical, seasonal sleet storm in early March took down most of the farm lines operated by the

Creston Mutual Telephone Co. and seriously impaired the communication facilities of many rural subscribers.

However, with true telephone spirit, the Appanoose County Telephone Co., Centerville, and the Lucas County Telephone Co., Chariton, dispatched crews of linemen to Creston to aid in restoring service. Despite inclement weather conditions the combined forces of the three companies had the damage repaired and all lines ready for service by noon, March 9.

Greene, Iowa.—The Greene Mutual Telephone Co., recently organized with members of the Greene Commercial Club taking an active part, has elected Dayton Mather as president. A committee has been appointed to review cooperative telephone systems at Nora Springs, Plainfield, Bristow and Dougherty.

Logan, Iowa.—Judge Charles Roe on March 17 signed an order dissolving the Persia Mutual Telephone Co. The corporation's charter expired in 1927. The suit, described as a friendly one, was brought by L. R. Chapman and other stockholders so the assets could be sold and the company reorganized. Carl F. Hamann was named receiver to sell the assets. Appointed appraisers were L. D. Meyers, Leon Yount and George Berry, all of Logan.

Bland, Mo.—Ed Stude of St. Louis, new owner of the local exchange, took over its management April 1. It was formerly owned by the Fidelity Telephone Co. Mr. Stude is a son-in-law of Frank Murphy of Owensville who at one time owned the Bland exchange.

Shelbina, Mo. — A new telephone building and improved system was proposed April 1 by the Western Light & Telephone Co. in a petition which it circulated to determine whether subscribers favor the improvements which would bring a rate increase.

At the same time, E. R. Luckett, district manager from Clarence, said a rate adjustment would be applied for Shelbina even if subscribers do not favor building a new system.

Jackson, Ohio. — Ralph Hamilton, general manager of the Ohio Standard Telephone Co., in Jackson and Wellston, has been elected president of the local board of education. He has been a member of the board for several years.

Brookings, S. D.—E. H. Sexauer has been named as a new member of the board of directors of the Northwestern Bell Telephone Co. Mr. Sexauer is a local resident and is head of a large elevator and seed company. He is a member of the board of directors of the United States Chamber of Commerce, former president of the Brookings Chamber of Commerce and also of the Greater South Dakota Association.

Van Horn, Texas—The Van Horn Telephone Exchange has been sold to Harry B. Rogers, capitalist and oil man of Tulsa, Okla., for a reported cash consideration of $10,000 by S. G. Smith, who has owned the exchange about 12 years.

Mr. Rogers owns the Fabens Telephone Co. which operates in Fabens, Sierra Blanca and Alpine. The manager of the three exchanges is C. H. Jennings of Fabens.

Bloomer, Wis.—Fire wrecked the local exchange of the Bloomer Telephone Co. in early March. It caused $6,000 damage to the hardware store building which housed the exchange.

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Electrolysis of Underground Cable (Cont.)

Electroplating is a process whereby a valuable metal, such as copper, silver, or gold, may be deposited in a thin film on cheaper metals, such as iron or steel. This is accomplished by placing the object to be plated and a sheet of the plating material in an *electrolyte*, consisting of a compound containing either an acid or an alkali and a *salt* of the metal being plated. The positive terminal of a low-voltage direct-current source is connected to the plating material (known as the *anode*) and the negative terminal of the source is connected to the object to be plated (known as the *cathode*).

The current in flowing from the positive to the negative terminal via the electrolyte *ionizes* (electrifies) the compound causing the metal atoms in the

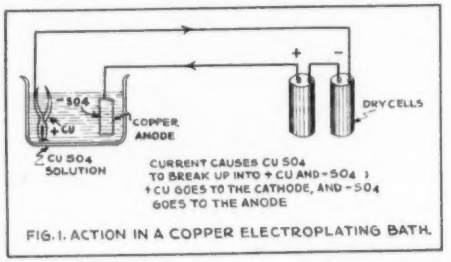

+
−
−SO4
+CU
COPPER ANODE
DRY CELLS
CU SO4 SOLUTION
CURRENT CAUSES CU SO4 TO BREAK UP INTO +CU AND −SO4 ; +CU GOES TO THE CATHODE, AND −SO4 GOES TO THE ANODE

FIG. 1. ACTION IN A COPPER ELECTROPLATING BATH.

electrolyte molecules to become charged. They are then attracted toward the negative terminal where they are deposited out of the solution and onto the object being plated. The remaining portion of the molecule, from which atoms of metal are extracted, is left in an unstable condition but becomes stable by attracting an atom of metal from the anode surface (or the plating material).

Thus we have a continuous process whereby metal is taken from the electrolyte and deposited on the immersed cathode (the object to be plated) while the metal removed from the electrolyte is replaced by a like amount which goes into the solution from the anode. The chemistry of this process can be better understood by reference to Fig. 1 which shows a

typical solution suitable for plating copper on other metals.

It will be noted that the electrolyte consists of a copper sulphate solution which is represented symbolically as $C\mu SO_4$. The compound has the proportions of one atom of copper, one of sulphur, and four of oxygen. When current passes through the solution the $C\mu SO_4$ is broken up into positively-charged $C\mu$ and negatively-charged SO_4. The atom of copper, being postively charged, is attracted to the negative terminal, and, therefore, is deposited on the cathode. The negative SO_4 portion of the molecule attracts an atom of copper from the anode to replace the one lost. The anode will, if the process is continued long enough, eventually be completely dissolved into the electrolyte.

Electrolysis of Sheath of Telephone Cables

In this data sheet series the discussion will be limited to cable sheath damage, for it is seldom that telephone companies suffer damage to underground metal conduit; probably because use of iron conduit is confined largely to lateral runs and riser pipes. In the preceding paragraphs describing the electroplating process it was shown that for metal to be taken from the anode and deposited on the cathode, a source of direct-current voltage and a suitable electrolyte were necessary. Likewise, for damage to occur to underground cable sheaths a source of voltage and a suitable electrolyte are necessary.

The source of voltage may be either a direct-current power system with earth return, or a soil condition which results in galvanic potentials. The necessary electrolyte is provided by soil moisture and soil chemicals. The amount of soil moisture and the chemical composition of the soil surrounding the cable sheath greatly affect the extent of electrolytic damage for a given amount of stray current. In some soils the amount of damage may be great while in others little or no sheath loss may result from the same amount of current flow.

In order for electrolytic damage to take place the cable sheath must be positive with respect to earth (under certain unusual conditions damage may result

when the sheath is negative). When the sheath is positive, current tends to leave the cable at various points along its length and enter the soil. This is shown in Fig. 2. It is at these points of current departure that electrolytic damage occurs.

The action is like that in an electroplating cell: the current flowing into the soil ionizes some of the molecules of the soil compound, leaving an unstable negatively-charged molecule which combines with the lead (Pb) of which the sheath is composed, thus eventually resulting in complete disintegration of the sheath if the action continues a sufficient length of time. Because at some points along a cable run, the soil may contain more moisture or chemicals more suitable to

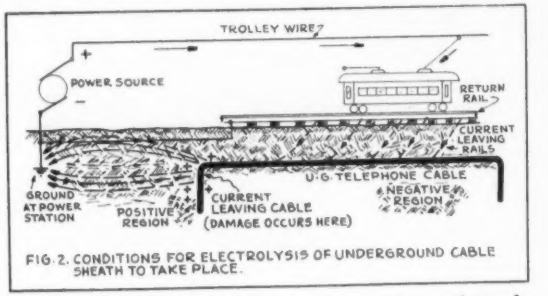


FIG. 2. CONDITIONS FOR ELECTROLYSIS OF UNDERGROUND CABLE SHEATH TO TAKE PLACE.

electrolysis, sheath damage is not uniform throughout an affected cable. Usually it is most severe at "concentration points."

These concentration points, soil and moisture conditions being equal, will occur at points in proximity to low resistance underground structures, such as water mains, gas mains or street car tracks, and will usually be most severe in the vicinity of the direct-current power substation which supplies the street railway system.

Factors Which Increase Tendency for Electrolysis

Some of the controllable factors which increase the tendency for electrolysis to take place, due to stray power current, are: Inadequate bonds between adjacent street car rails; lack of proper size negative return feeders and rail insulation to earth.

IN THE NATION'S CAPITAL

(Continued from page 23)

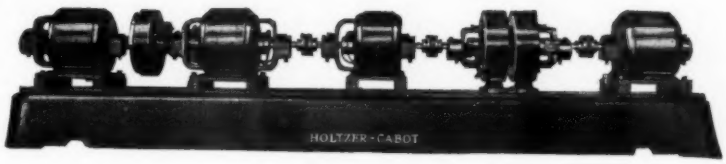
Logan-Walter bill) when the Supreme Court ruled that the FCC, under the present Communications Act, is under no obligation to obey any mandate from an appellate federal court with respect to the scope of hearings or the intervention of new parties or new evidence in cases which have been appealed from the FCC and reversed by higher courts on specific issues.

The Logan-Walter bill would compel about 130 administrative agencies of the federal government to operate under uniform rules of practice and procedure. Specifically, the bill would prohibit such agencies from issuing any further administrative rules except after publication of notice and public hearing. With regard to rules and regulations now outstanding, individuals affected may petition for a hearing on any of them, and the agency concerned is directed to grant such a hearing after public notice.

Finally, upon petition filed within 30 days from the date any rule is published, the U. S. Court of Appeals of the District of Columbia has the power to review the rule to determine whether it is in accordance with the Constitution and the law under which it has been issued. There are other provisions of the bill which go into more detail as to procedural limitations that would be imposed on an administrative agency, but these are the leading provisions.

THE BILL has encountered vigorous New Deal opposition in the House. It will get much more of the same in the Senate. Yet, the need for a curb on our growing bureaucracy is so obvious that it is admitted even by the New Dealers themselves. Their opposition is based upon piffling and technical grounds. It is significant that on a final roll call in the House, a vast majority, even on the Democratic side, refused to follow the leadership of Majority Leader Rayburn and cast their ballots along with the virtually unanimous Republican support.

Yet, the outlook for enactment of the bill at this session is far from rosy. If it could be brought to a vote in the Senate in its present form, it would undoubtedly be passed by a fair majority, despite the fact that the Senate is much more New Dealish than the House these days.



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POSITION WANTED: Twelve years' Bell experience, cable splicer, lineman, repairman, plant engineer; magneto, common battery, dial. Four years' business experience. Write No. 8921, care of TELEPHONY.

POSITION WANTED: Engineer 39 years old, fifteen years' experience telephone factories, operating companies (Germany, Italy). Willing to start anywhere, any capacity, modest salary. Address No. 8922, care of TELEPHONY.

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But the New Deal opposition is playing for time. They know that Congress, as a whole, wants to adjourn the session as soon as possible in the face of an election year. Consequently, the first line of defense of the ultra New Dealers will be to try to talk the bill to death in the hope of entangling it by a filibuster in the last-minute log-jam that always comes during the closing hours of the Congressional session.

Failing that, the opposition will attempt to paralyze the bill with debilitating amendments. There will probably be an attempt to exempt the SEC from the bill's operation; another amendment will probably propose the exemption of the FPC; another, the REA; and so on down the line.

If the bill is thus sabotaged in the Senate, it will have to go to conference. There the New Deal hatchet men would have a chance to get in their real mutilation. The outlook, under such circumstances, is that the conference would get deadlocked and the bill would die for the session.

However, the bill does have a fighting chance! If sufficient public support can be generated to get a majority of the Senators on their toes, determined that the bill shall pass and pass promptly, and in such a form that no conference committee could wreck it or knock it unconscious—then it would reach the White House for the Presidential signature.

Would President Roosevelt veto the bill? Ultra New Dealers say that he would. But they also said that he would veto the Hatch bill to take the office holders out of politics. Your correspondent guesses that during an election year the political risk would be too great for the President to veto the Logan-Walter bill. Hence, the New Deal pressure to prevent the bill from ever reaching his desk. Should the President veto the bill, he would precipitate such a campaign issue on the subject of federal bureaucracy that the Democrats might well wish long before the voting takes place next November that they had never heard of the Logan-Walter bill.

It may be true that the Logan-Walter bill in its present form is not without defect. It may be found, on the basis of experience, that it will unduly hamper the work of some of the more well-behaved federal bureaus and agencies. Professor Ralph E. Fuchs of the Washington University of St. Louis, has called the bill an "axe to correct the evils which require a surgeon's knife." But when American industry is in danger of being strangled to death by bureaucratic red tape, it seems hardly sensible to argue over whether the tape should be cut by the crudest broad axe or the most delicate surgeon's scalpel. To change the metaphor, the big job is getting the harness on federal bureaucracy. It will be easy enough later on to let out some of the straps or reins which may be found unduly binding.

Anyhow, the New Deal bill drafters are hardly in a good position to oppose a law because it goes too far in seeking to correct admitted evils. This has been the policy of the present administration in practically all of their reform measures. The National Labor Relations Act, for example, admittedly gives too much power to an administrative board and has caused abuses which even the board itself has had to concede. Yet the administration has declined over many years to remove such excesses when their existence was demonstrated.

The "death sentence" of the Holding Company Act may soon be revealed as another example of burning down the house in order to get rid of a few rats. It was for this reason that many of the Congressmen who last week voted to put a halter on these high and mighty federal bureaus, relished the incidental opportunity of giving the administration a taste of its own medicine.

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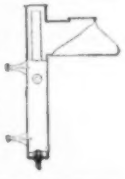

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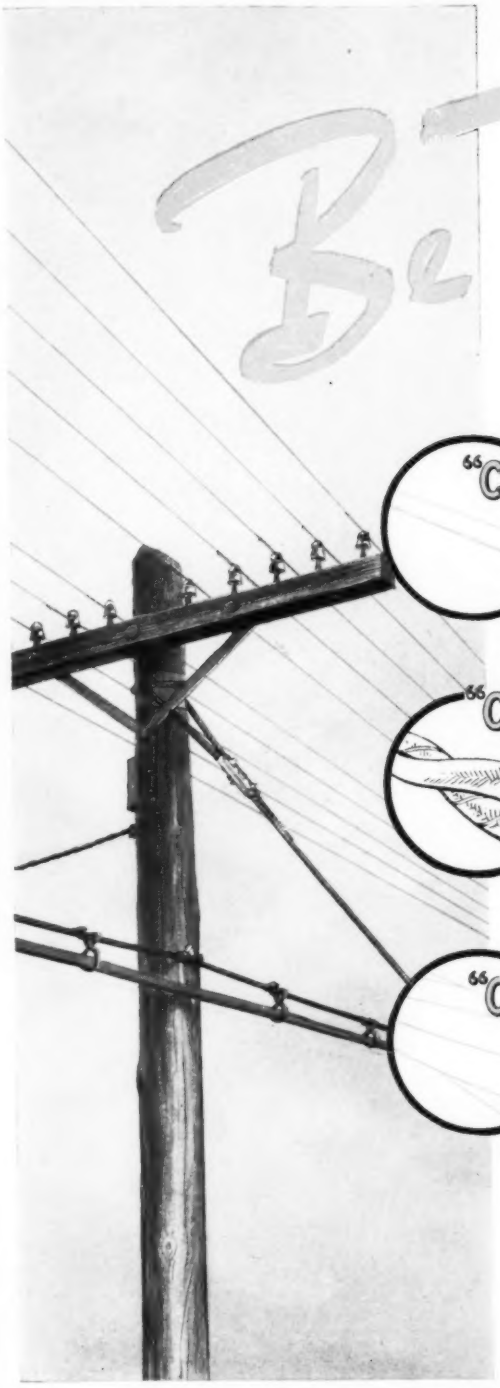

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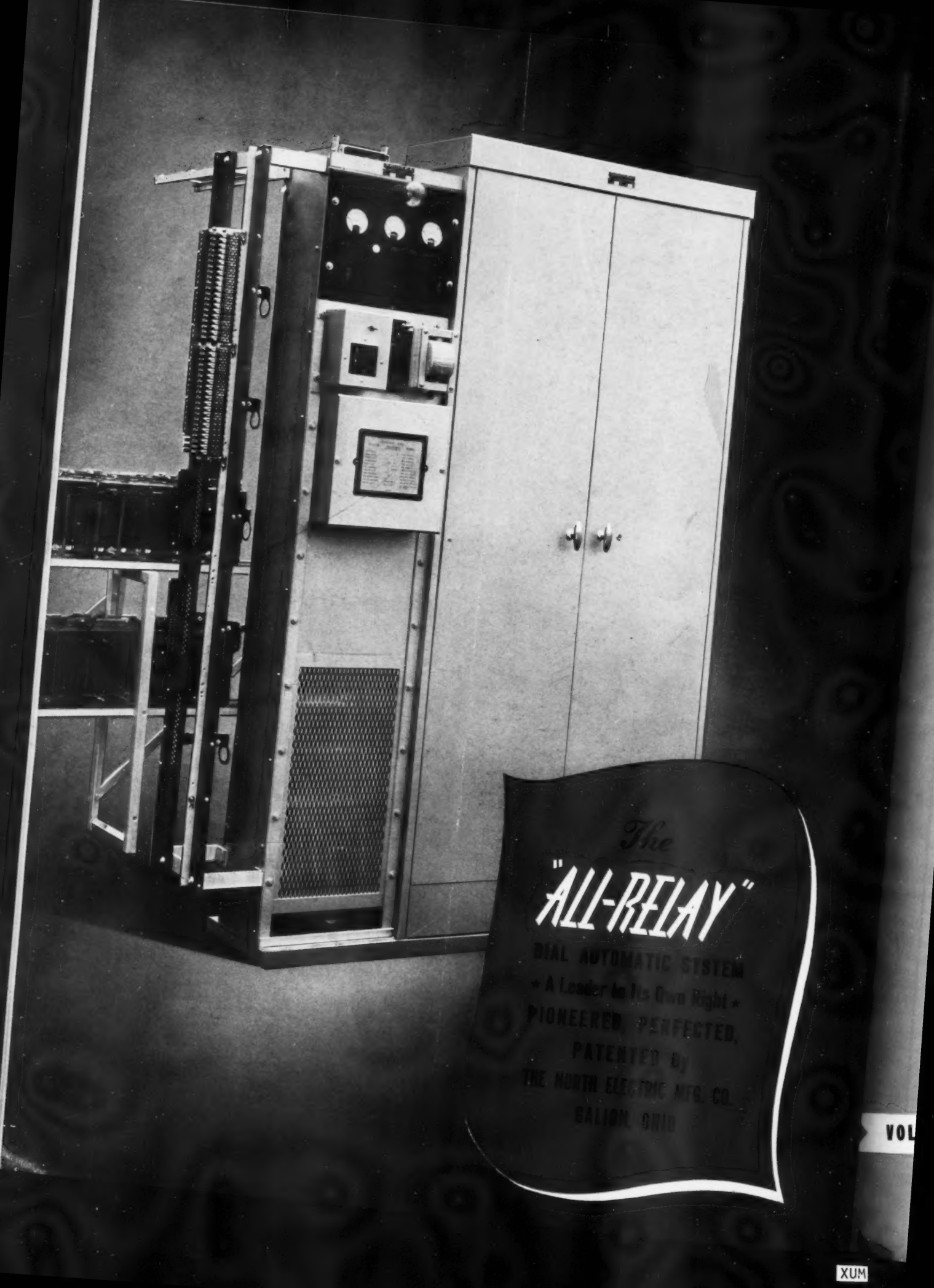
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